AUTOMOTIVE INDUSTRIES

PASSENGER CARS • TRUCKS • BUSES • AIRCRAFT • TRACTORS • ENGINES • BODIES • TRAILERS • ROAD MACHINERY • FARM MACHINERY
PARTS AND COMPONENTS • ACCESSORIES • PRODUCTION EQUIPMENT • SERVICE EQUIPMENT • MAINTENANCE EQUIPMENT
ENGINEERING • PRODUCTION • MANAGEMENT

JANUARY 15, 1950

In This Issue . . .

1950 Outlook for Automobile, Tractor and Aircraft Industries

Torque Converter Made of Stamped Steel Parts

New Look of the 1950 Cadillacs

More Tractor Gears at Lower Costs

Precision Testing of Gas Turbine Disks

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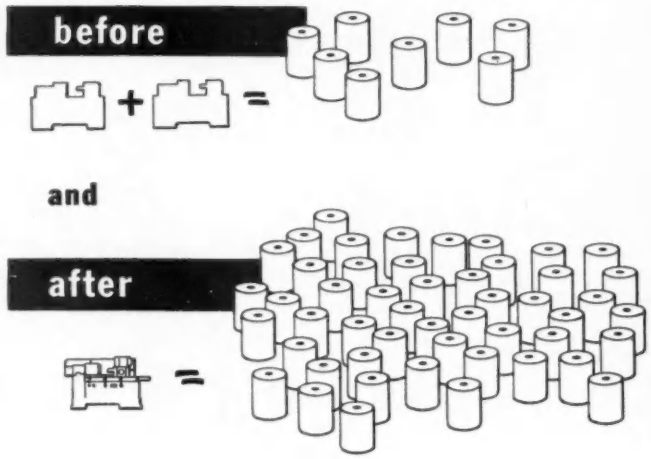
A CHILTON PUBLICATION

one hour's grinding production



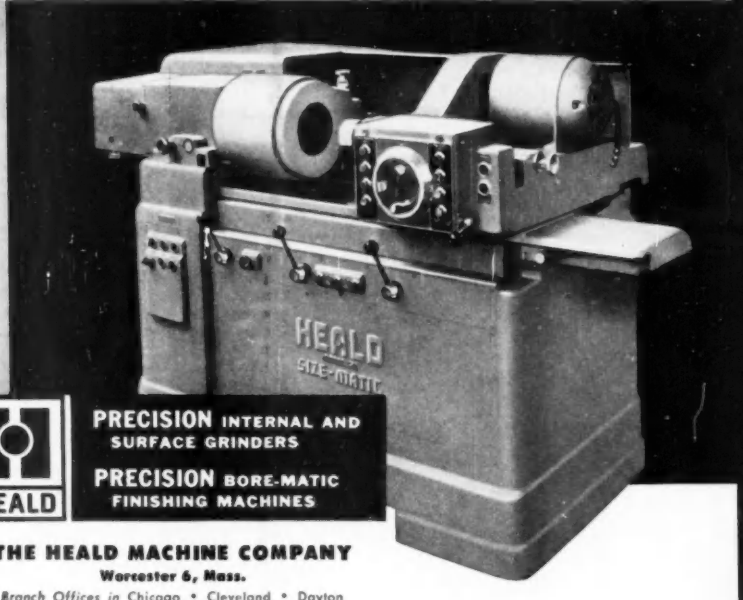
the installation of a New Heald Internal

In case you didn't count them, there are *fifty* cam rollers in the "after" picture—compared to eight "before." That's how much difference a New Heald Model 271 Size-Matic Internal Grinder was able to make in the production picture of a textile machinery manufacturer. Before this Heald machine went on the job, these cam rollers were finished on two older type grinders. Now one Model 271 turns out more than six times as many parts per hour!

This machine grinds a variety of textile cam rollers, to a tolerance of .0005" for size. In the case of one part, with a long bore, a damped quill is used to help eliminate the possibility of chatter and resultant unsatisfactory finish.

This is a typical example of how Heald engineering can help to step up production schedules and cut the cost of precision finishing operations.

These five different types of textile cam rollers are internally ground faster, and with greater precision, on the Heald Model 271 Size-Matic shown above.



HEALD

PRECISION INTERNAL AND SURFACE GRINDERS

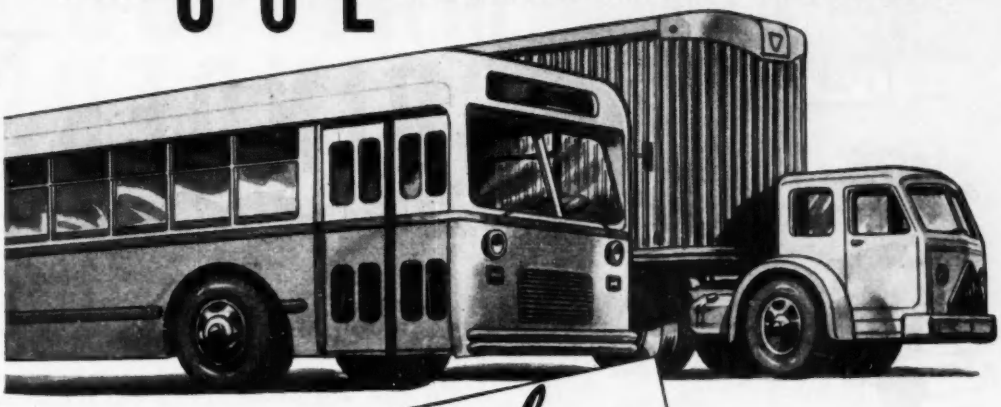
PRECISION BORE-MATIC FINISHING MACHINES

THE HEALD MACHINE COMPANY

Worcester 6, Mass.

Branch Offices in Chicago • Cleveland • Dayton
Detroit • Indianapolis • Lansing • New York

FOR C·O·E TRUCKS AND BUSES...



Horizontal UNDER-FLOOR

... a new WAUKESHA ENGINE

• *Check these modern features:*

Crankcase—Combined crankcase and cylinder block lies in horizontal position with cylinders at 10° angle above horizontal supporting arms. Alloy iron casting is exceptionally rigid to insure constant alignment of all moving parts.

Cylinders—Renewable, wet-type cylinder sleeves of Molychrome alloy, heat-treated and hardened to insure long life.

Pistons—Heavy-duty aluminum alloy with four straight-side rings, all above the piston pin. Top ring is chrome plated. Piston pin is full floating.

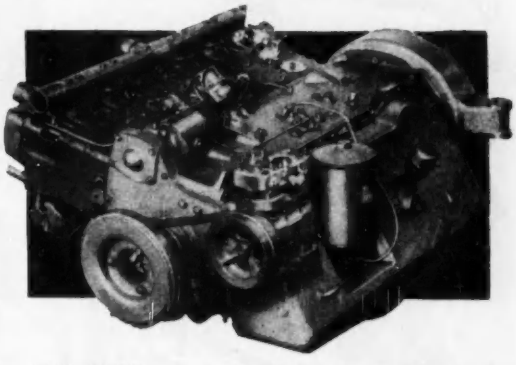
Counter-balanced Crankshaft—Drop-forged heat-treated alloy steel. Fully counter-balanced and mounted in seven 3¼-inch steel-backed copper-lead high-duty precision bearings. All main journals and crankpins are hardened to test 600 Brinell. The front end has a highly efficient vibration dampner.

Valves—Exhaust valves are Stellite-faced chrome-nickel forgings seating in Stellite inserts.

Cooling—A positive gear driven, ball bearing, packless coolant pump.

Lubrication—The positive gear driven oil pump forces oil under pressure to every main, rod, piston pin, camshaft, idler gear stud, and oil pump drive shaft bearing. An intermittent metered pressure line leads oil to the rocker arms and valve chamber as well as to the timing gear spray and air brake compressor. A large capacity oil sump with compartmentation insures a constant oil supply at all times. Both bayonet and indicating dial gauges are provided, as well as convenient inspection and drain openings. A large waste-packed filter is mounted on the oil pan.

Governor—Waukesha-built, gear driven, enclosed and flood-oiled over speed governor; does not prevent manual speed control up to predetermined top speed.



MODEL 148-GKB...Overall Lgth., 50 in....Overall Width, 49 in. ...Overall Depth, 24 in....Maximum Drop from Support, 11½ in.... Bore and Stroke, 4½ x 5½ in....Six Cylinders...525 cu. in. Displacement...Seven Main Bearings...Flywheel Housing, SAE No. 3 ...172 hp. Max. at 2600 rpm.

•

You'll want to learn the other details. Write for full particulars or engineering consultation. No obligation.

WAUKESHA MOTOR COMPANY • WAUKESHA, WISCONSIN

NEW YORK • TULSA • LOS ANGELES

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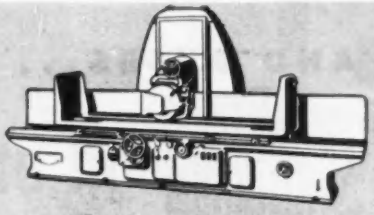
If its a Flat Surface to Grind
There's a Mattison to Grind it.

● With the addition of the production grinding machinery formerly made by the Hanchett Manufacturing Company, Mattison now is in a position to work with you on all your surface, face and disc grinding problems. These machines are made in various types to handle a wide range of work. Experienced fixture engineers are available to give you best production efficiency with Mattison Machines.

For any flat grinding, ask for our recommendations on the proper method and machine for your job. No obligation, of course.

For catalog on all machines, ask for free copy of general bulletin.

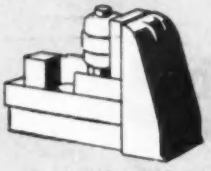


Precision Surface Grinders Horizontal Spindle

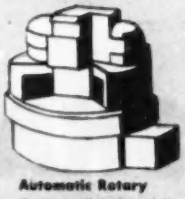
Disc Grinders, Double Spindle Type

Vertical Spindle Disc Grinders

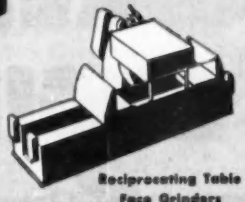
Plano Grinders, Rotary Table Type



Rotary Table Surface Grinders

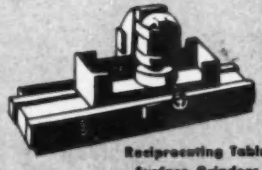


Automatic Rotary Surface Grinders



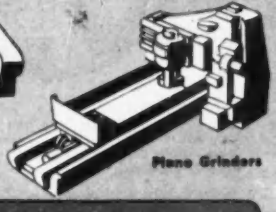
Reciprocating Table Face Grinders

Disc Grinders, Single Spindle Type



Reciprocating Table Surface Grinders Vertical Spindle

Face Grinders, Traveling Wheel

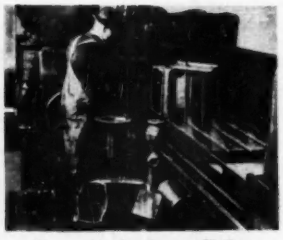


Plano Grinders

40 hours before — now 4 hours. Pump case ground on Mattison Horizontal Spindle Precision Surface Grinder

320 surfaces of cast iron compression heads per hour, removing 1/32" stock with Mattison No. 24 Rotary Surface Grinder

900 connecting rods per hour, using 40 station fixture to finish grind crank and wrist pin end of assembled rod with Mattison No. 72 Grinder



Shows variety of work run on Mattison Face Grinders

MATTISON MACHINE WORKS
ROCKFORD · ILLINOIS

AUTOMOTIVE INDUSTRIES

Published Semi-Monthly

January 15, 1950 Vol. 102, No. 2

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Your production parts, from 1/16" to 2 5/8" are made with the utmost precision and delivery is assured according to schedule.

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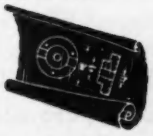

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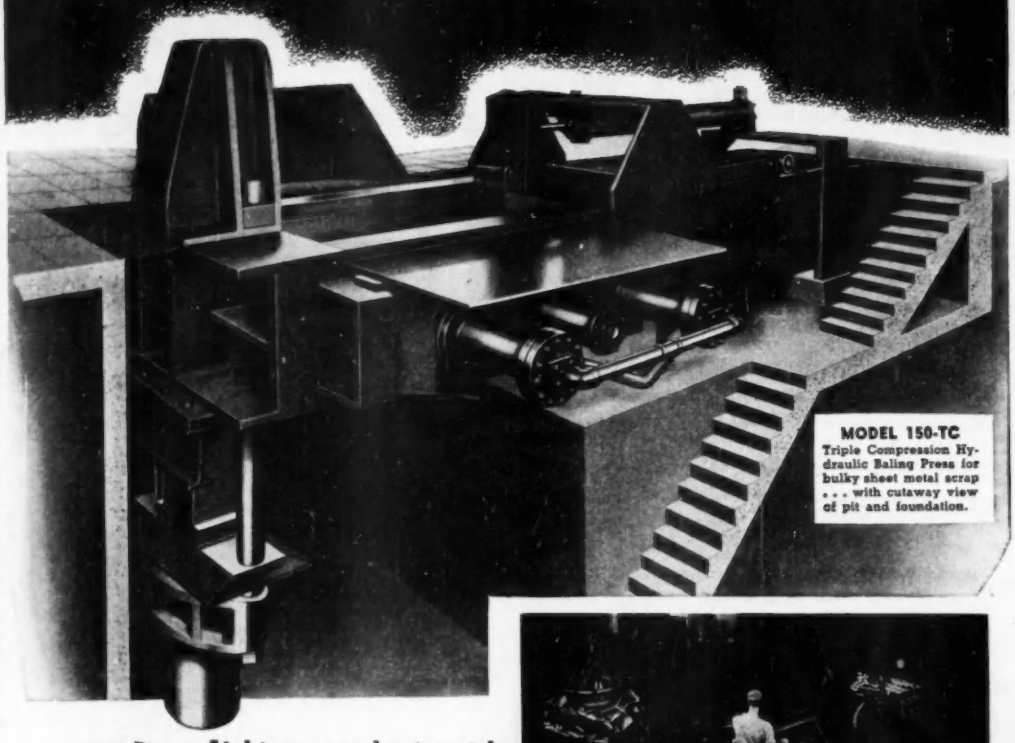
Sheet Metal SCRAP MUST Be BALED!



MODEL 150-TC
Triple Compression Hydraulic Baling Press for bulky sheet metal scrap . . . with cutaway view of pit and foundation.

Operating view of a G-H Triple Compression Baler which has served a large Eastern metal working plant profitably for many years.

Light gauge sheet metal "scrap" . . . such as industrial stampings and clippings . . . is an increasingly important factor in the production of new metal, and in the conservation of natural resources. For greatest economy and most effective utilization, it must be compressed into compact BALES of proper size and density. As such, it brings top market prices from mills, smelters, foundries.

The Hydraulic, Scrap-Metal Baling Press is necessary, profit-producing equipment in any well ordered plant where this type of scrap metal is generated in sufficient volume. Galland-Henning builds powerful, efficient hydraulic balers in a range of sizes and capacities to meet every industrial need. For Experienced Counsel on Profitable Baling of your Sheet Metal Scrap, write —

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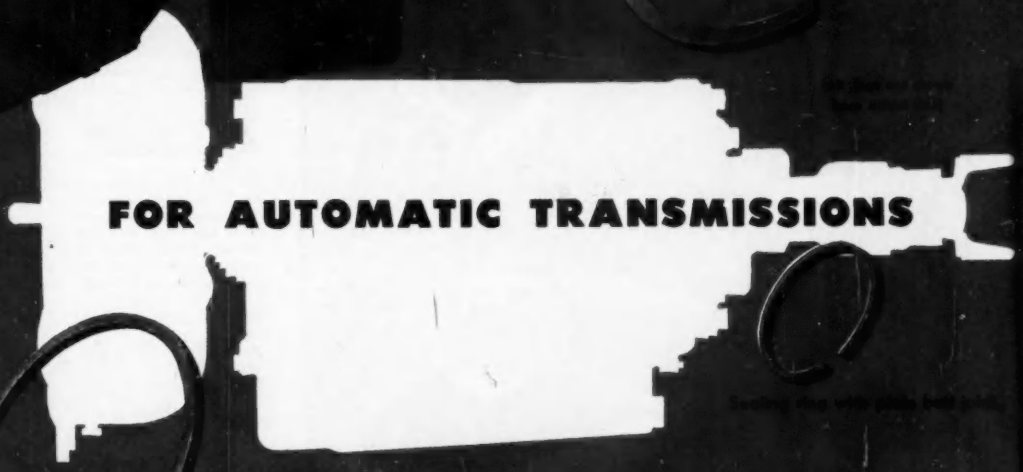
GALLAND-HENNING

SCRAP METAL BALING PRESSES

A 5589-1P

Oil Seal Rings...



FOR AUTOMATIC TRANSMISSIONS

Oil seal rings of various designs and sizes are vital parts of today's automatic transmissions. While automatic transmissions were still in the experimental stage, it was only natural that their designers should bring their sealing ring problems to Muskegon, a leading producer of cast iron piston rings. Muskegon's knowledge of the material and finish requirements for rings of this type makes it "OIL SEAL RING HEADQUARTERS." Here, designers can make full use of Muskegon's experienced engineering service. Here, purchasing agents can discover economies made possible by Muskegon's facilities for high precision, mass production of cast iron rings. Write us today about any sealing ring problem you may have.

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OIL SEAL RING HEADQUARTERS

Policy

Piston Rings

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MUSKEGON, MICHIGAN
PLANTS AT MUSKEGON AND SPARTA

A break for your brakes . . .

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So strong, so dependable that over 95% of today's automobiles use it—that's amazing, double-walled Bundyweld Tubing! To hydraulic brake systems like the one below, as to over 20 other automotive applications, Bundyweld brings sturdiness, safety and superiority.

Whammo! Bundyweld thrives on shock and strain—thanks to its exclusive double-walled construction! It's a tubing with real muscle, and it's *the* right tubing for such rugged automotive uses as gas and oil lines, hydraulic push-button systems and many others.

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Stop! Look at these other features of Bundyweld. It's extremely ductile—cut it, bend it, join it with ease. It's lightweight, readily fabricated, always held to close tolerances—and you'll ride along with the cost, too.

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because of
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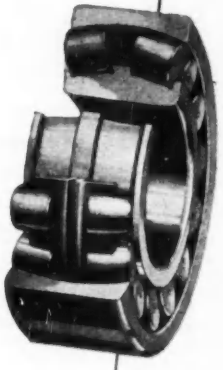
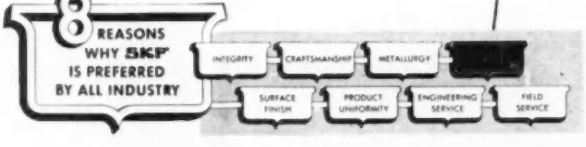
Remember leapfrog? How you used to have to skim over just right? Well, it's very much the same thing in specifying bearings. You don't want tolerances too great... and you don't want tolerances closer than the job demands. But you want to be sure that tolerances are *right*... are *always* properly controlled... *always* meet established standards. SKF adheres rigidly to these standards. Ceaseless vigilance in every stage of production assures complete control of tolerance throughout the entire manufacturing cycle. You can always be sure that any SKF Bearing will exactly meet your requirements... and will meet them again and again. Never forget, either, that *tolerance control* is only *one* reason why SKF Bearings will help you build equipment which, through smooth, economical performance, helps develop greater acceptance for your product. **SKF** INDUSTRIES, INC., PHILADELPHIA 32, PA.



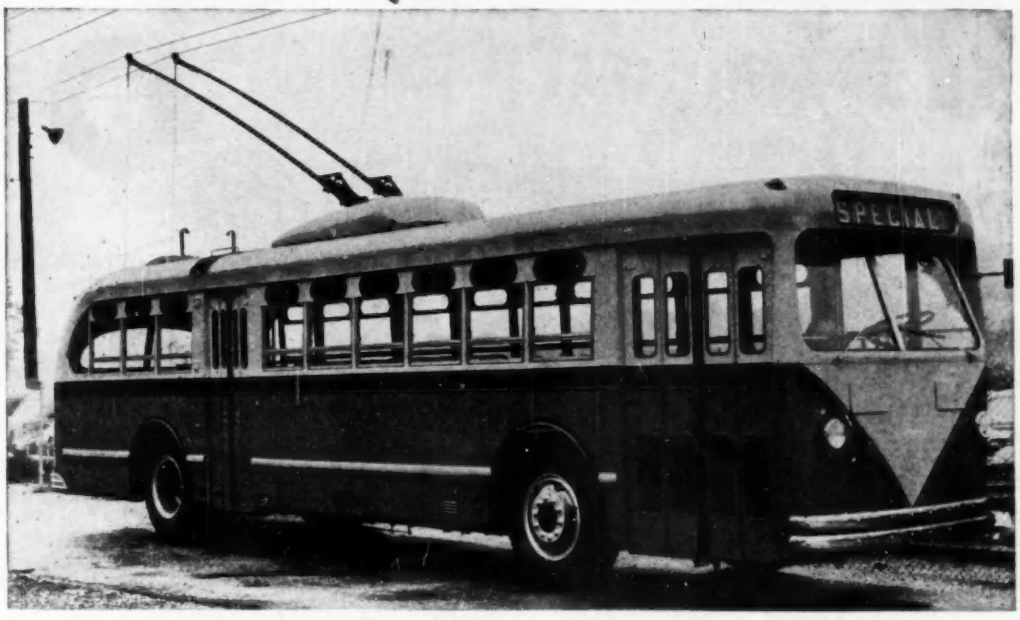
SKF
Ball and Roller Bearings



Inventors and Pioneers of the Self-Aligning Ball Bearing and Spherical Roller Bearing

7050

Steering AT ITS BEST



PULLMAN-STANDARD 45-PASSENGER TROLLEY COACH

ROSS BRINGS EASE . . . AND ECONOMY

ANOTHER OUTSTANDING product of the Pullman-Standard Car Manufacturing Company, of Chicago, is the coach pictured above, built for the Milwaukee Electric Railway & Transport Company. Modern in its design, equipment and appearance, this fine coach is Ross-steered, of course.

The Ross policy of incorporating advancements in design as they are proved by exhaustive tests has resulted in many recent improvements. Current Ross models have:

(1) ***Increased mechanical reduction*** . . . (2) ***More compactness*** . . . (3) ***Reduction in weight*** . . . (4) ***Greater arm angular-travel*** . . . (5) ***Improved metallurgy*** . . . (6) ***Increased efficiency.***

Throughout 42 years of leadership in this industry, Ross gears have been distinguished for long life, simplicity of adjustment and maintenance of long-recognized qualities of safety, stability and performance. We invite discussion of any steering problem.

Ross

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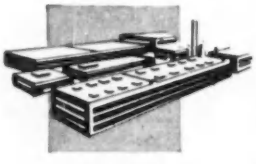
Here are just a few of its features that you can always depend on: range from wool softness to rock hardness—never loses shape—does not ravel or fray—resists oil, water, heat, age, resilient, flexible, compressible—may be cut to extremely close tolerances for small parts—unsurpassed in uniformity.

Western Felt engineers with decades of experience in the use of felt stand ready to counsel you.



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with the *RIGHT* gear ratios

Sure, it takes *horsepower* to pull a heavy load up a steep grade, whether it is on the highway or off.

But don't overlook the part your gear box must play in delivering that horse-power to the wheels. It's in the transmission that the horsepower goes to work.

Only a transmission with exactly the right gear ratios for a particular set of operating conditions will permit most effective use of the engine's horsepower.

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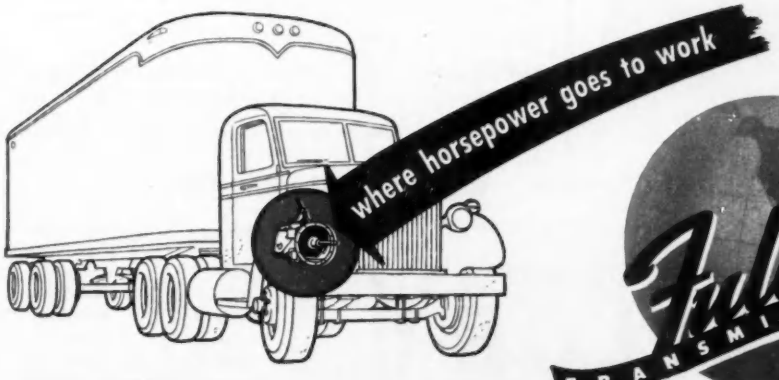

Fuller
TRANSMISSIONS

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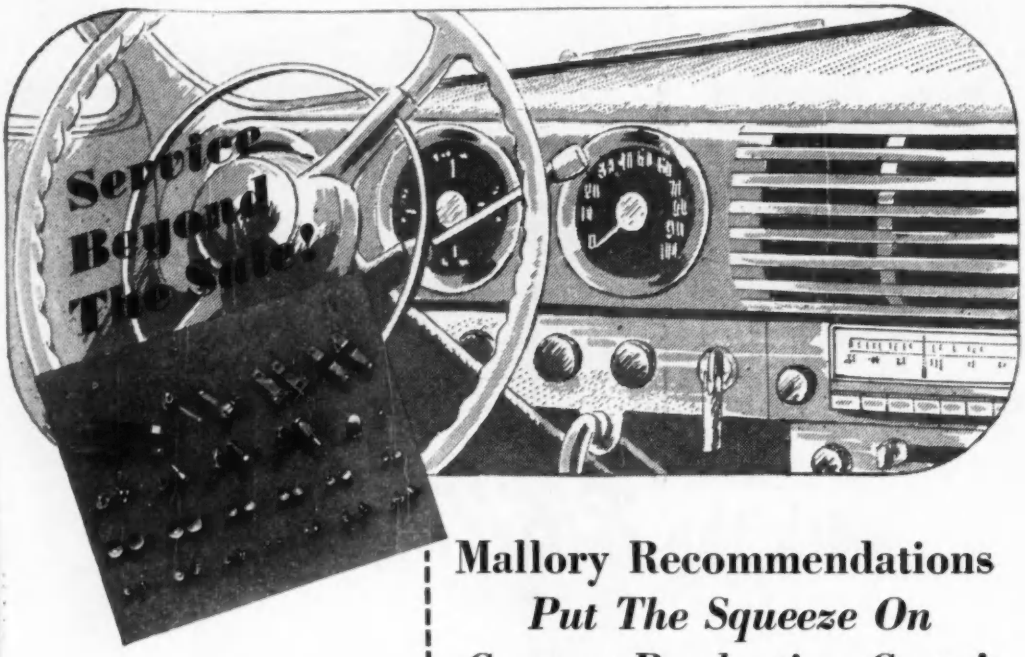

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Tungsten is used in contacts for electrical equipment where resistance to electrical arcing and wear are important. Silver and silver alloys are used where low resistance is important. Mallory has developed contact metals from many alloys to meet every contact requirement. Among the many Mallory contact alloys are the Elkonites* and Elkonium* alloys. Mallory will gladly work with you to find the right contacts to meet your specifications. Write today.

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AUTOMOTIVE INDUSTRIES
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High Spots of This Issue

★ 1950 Automobile Production Outlook Bright

This first of three related articles forecasts a cornucopia of cars flowing from the country's production lines, probably almost equaling '49's amazing record. Volume of replacement parts and accessories, price and installment credit trends, introduction of small light cars, automatic transmissions, and new engines are discussed. See page 30.

★ What 1950 Holds for the Tractor Industry

The tractor industry expects to produce a volume exceeding $1.25 billion for the fourth consecutive year. Emphatic new model activities in Diesel powered units are noteworthy. Brightest spot is in the farm tractor market. This prognosticalysis (prognostication and analysis) also explains two well developed market soft spots—exports and industrial tractors. Page 34.

★ Aircraft Industry to Set Record in '50

Significant fact in prediction for '50 is the certainty that production will be almost solely for the United States Government with the U. S. Air Force the principal consumer. Specific complications in dealing with this market are clearly portrayed by the author, Robert McLarren. His revealing account starts on page 36.

★ 1950 Cadillacs Feature New Bodies

Coincident are new mechanical changes. Probably most outstanding is redesign of the front suspension system in which direct acting shock absorbers are mounted within the coil springs. Additionally Cadillac presents improved hydramatic transmission and braking, and introduction of a carburetor idle heating system said to be a "first" in the industry. Complete details, page 42.

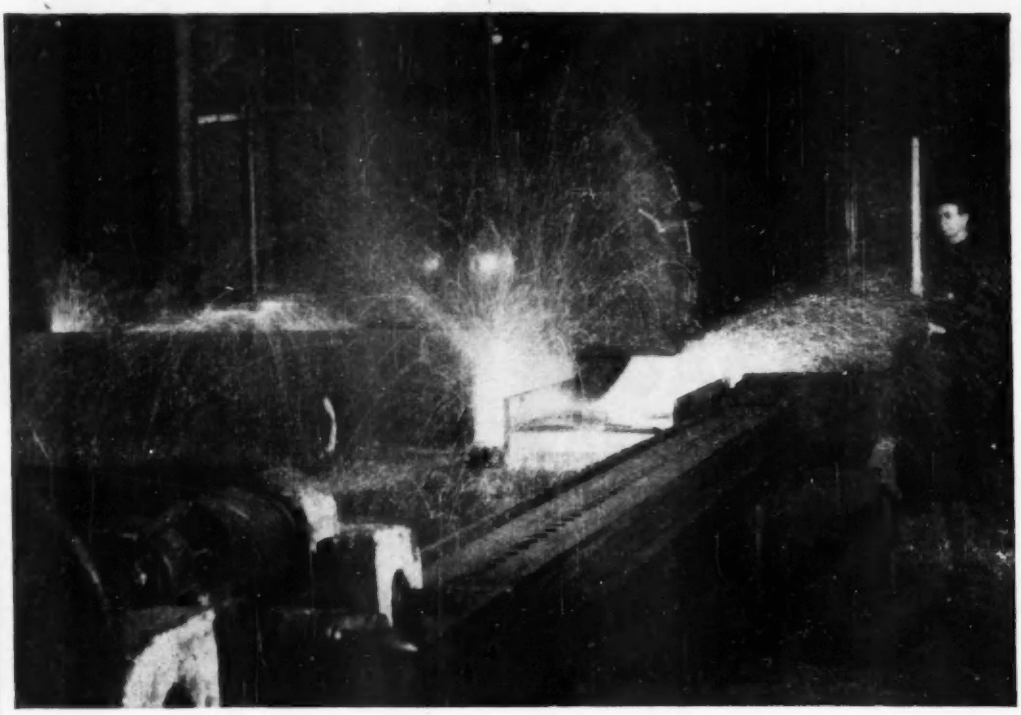
★ Torque Converter of Stamped Steel Parts

Construction and assembly of a torque converter and flywheel "package" employed as a component in the 1950 Studebaker automatic transmission is the subject of this interesting article. Package is being manufactured by the Long Mfg. Division of Borg-Warner Corp. The chief engineer of the Clutch Division tells the story, page 44.

★ 24 New Product Items And Other High Spots, Such As:

Advanced applications of casting resins; precision testing of gas turbine disks; a hypersonic wind tunnel for continuous operation; and how Oliver Corp. is producing more tractor gears at lower costs.

News of the Automotive Industries, Page 17
For Complete Table of Contents, See Page 3



Cuts Beams Like Butter . . .

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Biting through a 24 inch beam at a Ryerson plant, this big friction saw completes the cut in 11.6 seconds—literally cuts hard steel like soft butter. The speed of the cut results in the very minimum of burr and a new method of maintaining blade alignment assures a straight, true edge.

This new saw is typical of the equipment that's ready to work for you at your nearby Ryerson plant. Another—a new metal saw with a big 18 x 18 inch capacity. Using high speed hack saw blades, it cuts bar steel to close-tolerances, and every cut, square or angular, has an unusually accurate surface.

Then there's the flame-cutting machine, with an electric eye to follow your sketch or blue-print, which cuts irregular shapes with amazing accuracy —to within fifteen thousandths of an inch! These machines, and many others, work for you as your own when you call us for steel from stock.

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News of the AUTOMOTIVE INDUSTRIES

Vol. 102, No. 2 January 15, 1950

1949 Vehicle Production Hits 6,250,000

Unofficial figures available show that total production of approximately 6,250,000 cars and trucks in the United States last year exceeded preliminary estimates by about 50,000. Late December forecasts had put the total at 6.2 million. The record-breaking volume was accounted for by an estimated output of 5,120,000 passenger cars and 1,130,000 trucks. Combined production of cars and trucks in 1949 surpassed the previous 1929 record by more than 891,000 units. Passenger cars were 533,000 units higher than in 1929 and 1,200,000 higher than in 1948. Truck production fell short of the all-time 1948 record by about 235,000, but exceeded the 1929 total by nearly 359,000.

Acme

SWANKY MEXICAN

Designed and built in Mexico, the DM Nacional, shown here, is the first of other production models which Antonio Ruiz Galindo, Mexican industrialist, expects to have rolling off the assembly line in July. With a 96-in. wheelbase, the car is powered by a Ford-built V-8 engine, and has a speed of 100 mph.

Ford to Quit Production of Buses April 30

The Ford Motor Co. will go out of the bus manufacturing business at the end of April, according to E. R. Breech, executive vice president. He said that the move will permit greater concentration on car and truck production. He added that the move is also being made because of the very limited market for motor coaches. Ford has been in the bus business since 1939. Last year the company built and sold only about 200 buses. Production of school bus chassis, however, will continue. William B. Livingstone, president of Metropolitan Motor Coaches, Inc., national sales agency for Ford buses since Sept., 1947, said that the organization will be liquidated. Ford will assume the responsibilities of the agency under its bus warranties and will continue to supply parts for service as long as there is a reasonable demand.

Permit Diesel Cars to Enter 1950 Indianapolis Race

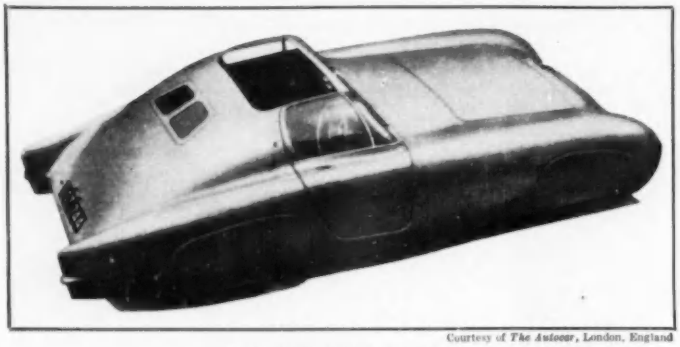
The officials of the Indianapolis Motor Speedway have disclosed that race cars powered by Diesel engines would be allowed to enter the 1950 race. For conventional internal combustion engines, maximum size remains unchanged at 183.06 cu in. for supercharged cars, and 274.59 cu in. for non-supercharged engines. However, two-cycle supercharged Diesel engines up to 274.59 cu in., and four-cycle engines of that type up to 402.68 cu in. will also be permitted this year.

Willys to Build Engine for New Small K-F Car

Kaiser-Frazer and Willys have jointly confirmed that engines for the new small K-F car scheduled for next summer will be built by Willys (see page 18, Dec. 15th, AUTOMOTIVE INDUSTRIES). The announcement referred to the power plant only as the new "supersonic" engine. While it was stated specifically that no additional information on the engine will be revealed until the new cars are announced by K-F, it is assumed that it will be the new engine that Willys announced recently was under development. The contract calls for additional tools and facilities being supplied by K-F for the Willys engine plant at Toledo. The move is an interesting one since Willys has not given up its idea of building a small passenger car, raising the question as to what actual differences would exist between engines for the K-F car and a Willys passenger car, although the announcement stated that specification details will be peculiar to each company's requirements.

Nash Earnings Hit All-Time Record Last Year

The Nash-Kelvinator Corp. hit a new high in earnings, sales, production and employment last year, according to George W. Mason, president. Profits for the fiscal year ended Sept. 30 were more than $26 million, compared with the previous high of slightly more than $20 million the preceding year. Net sales were in excess of $364 million, compared with more than $302 million for the 1948 fiscal year, the previous high point. The company's earnings represented 7.2 cents per dollar of sales, the highest in history. Mr. Mason revealed that N-K has spent more than $50 million since the end of the war for plant expansion and modernization and for tooling, and that working capital has increased $33 million and long-term debts decreased $14 million. He also revealed that further expenditures will be necessary this year to complete tooling and facilities for production of the new smaller passenger car which the company will bring out this spring. Production of automobiles in fiscal



Courtesy of *The Autocar*, London, England

TRANSPARENTLY LOW

This custom-built Leston Special, owned by Mr. L. Leston, London, England, has an overall height of 4 ft, 3 in. Constructed on the chassis of a prewar 2½ litre S.S. 100, the Leston Special features aluminum panels and, from the cockpit of a wartime airplane, transparent curved plastic panels.

1949, hit an all-time record of 139,521 units, 16 per cent ahead of 1948 and more than double average production for the last five years before the war.

New Higher Compression Engines on the Way

Despite the lack of official confirmation, information from reliable sources indicates that new engines of the higher compression overhead-valve type are in the plans of at least three companies. Ford is known to be converting its V-8 engines to overhead valves and also has a new in-line six-cyl engine of that type well along in development. Chrysler has an in-line six of overhead valve construction under development with bearings between each crank throw, according to reports, and also has an experimental valve-in-head V-8 engine. Another reliable report states that Studebaker has placed a large order for tooling for a new engine for 1951 models. It is said to be of the higher compression V-8 type.

Ford 1949 Production Highest in 20 Years

The Ford Motor Co. in 1949 reached its highest production level in 20 years, turning out 1,426,727 cars, trucks, tractors and buses. The breakdown includes 840,980 cars and 244,742 trucks by the Ford Div., 203,239 Mercurys, 33,329 Lincolns, and 104,267 tractors. Production last year exceeded 1948 by nearly 275,000 units. In a year-end statement, E. R. Breech, Ford executive vice president, said that further important additions to production facilities will continue this year as part of the improvement program announced in 1946 envisioning expenditures of $100 million a year. Meanwhile, Ford of Canada set a new all-time production record for yearly production in a Canadian automobile plant. Output last year totaled 111,388 units as of Dec. 28, surpassing the previous record set in 1941 with two days' production still to go.

Reo to Start Production of Military Trucks

Reo will begin production in March on a government order for about 5000 military trucks and parts, totaling more than $30 million. Pilot models of the new truck have been tested and demonstrated before military officials from the United States, Britain and Canada. It is a 2½-ton 6 by 6 model, designed to reduce the number of spare parts required by about one-third.

Chevrolet Reports Backlog of 250,000 Orders

Apparently Chevrolet is the only company still talking about unfilled orders. T. H. Keating, general manager, said at the time of the 1950 model announcement that dealers had 250,000 unfilled orders on the books. He said that schedules for the first four months of this year called for production within 100,000 units of the entire first six months' output of 1949.

Chevrolet cars and trucks built in U. S. plants last year totaled 1,493,501 units which was a new record, according to Mr. Keating. The previous record was 1,254,687 units in 1929. The output for 1949 consisted of 1,109,958 passenger cars and 383,543 trucks.

SLEEK AND SAFE

An entirely new body style in the Chrysler line for 1950, the Chrysler Windsor Newport, shown above, is also offered in the New Yorker (eight cyl) and Town and Country (eight-cyl) series. A hard-top convertible, it is designed for owners who want the lines of a convertible with the safety of a permanent steel top. Windows and window-posts may be lowered completely out of sight.

Pontiac Starts Construction of Engineering Building

GM's Pontiac Motor Div. has started construction of its new engineering building. The two-story structure will provide 213,546 sq ft of working area and will house offices, laboratories, repair garages, machine shop, sheet metal and paint shops, dynamometer laboratory, cold room, carburetor flow room, transmission testing and stress laboratory and a copper-walled radio screen room.

Chevrolet to Add Tooling for Automatic Drive

Considerably more tooling will be required by Chevrolet than is now installed to meet the expected demand for the new Powerglide automatic transmission announced on 1950 models. T. H. Keating, general manager, states that there is going to be considerable shortage of the transmissions at first, and that subsequent production facilities will be installed to obtain the production indicated by public demand. The transmission is assembled at Cleveland.

Buick Price Reductions Made on Costly Lines

Analysis of price reductions made by Buick in late December reveals that they were selective and confined to so-called luxury models and higher priced lines. Cuts in base prices range from $25 to $270 and when the $40 previous reduction in the Dynaflow transmission is added, the reductions range from $65 to $310 under 1949 prices for cars similarly equipped. In the Roadmaster series, reductions including the price cut on Dynaflow are $310 on the hardtop convertible, $290 on the station wagon, $190 on the convertible, $65 on the two-door sedanette, and $76 on the four-door sedan. In the Super series, the station wagon is cut $300 and the convertible $85 when Dynaflow is included. Prices on the Special series remain unchanged, although recent reductions in some accessory prices when combined with the cut in the price of the Dynaflow makes possible a substantial reduction for cars in the Special series equipped with the normal number of accessories, ranging up to $87.10 under the 1949 price.

James Zeder to Head SAE for 1950

James C. Zeder, chairman of the engineering board, Chrysler Corp., has been elected president of the Society of Automotive Engineers for 1950. Other officers elected by the SAE for 1950 are: Raymond D. Kelly, United Air Lines, vice president, Air Transport Activity; Harold D. Hoekstra, Civil Aeronautics Administration, vice president, Aircraft Activity; Wright A. Parkins, Pratt & Whitney Aircraft, vice president, Aircraft Powerplant Activity; Rex A. Terry, Chrysler Corp., vice president, Body Activity; Albert H. Fox, Standard Oil Co. of Indiana, Diesel Engine Activity; Roy W. Roush, Timken-Detroit Axle Co., vice president, Engineering Materials Activity; Arthur O. Willey, the Lubrizol Corp., vice president, Fuels & Lubricants Activity; Edward N. Cole, GM's Cadillac Motor Car Div., vice president, Passenger Car Activity; Robert F. Steeneck, Fafnir Bearing Co., vice president, Production Activity; Wayne H. Worthington, John Deere Waterloo Tractor Works, vice president, Tractor & Farm Machinery Activity; Matt E. Nuttila, Cities Service Oil Co., vice president, Transportation & Maintenance Activity; and William P. Michell, Spicer Mfg. Div. of Dana Corp., vice president, Truck & Bus Activity. William E. Conway, Studebaker Corp., Philip J. Kent, Chrysler Corp., and Dale Roeder, Ford Motor Co., are the three new councilors.

Completing the 1949-1950 term as councilors are G. E. Burks, Caterpillar Tractor Co.; Norman H. Daniel, GM Products of Canada; and Earle A. Ryder, Pratt & Whitney Aircraft. B. B. Bachman, Autocar Co., serves again as treasurer. R. J. S. Pigott, Gulf Research and Development Co., and S. W. Sparrow, Studebaker Corp., continue on the Council as past presidents. All vice presidents representing activities also serve on the Council.

Willys Earnings Decline Sharply from Year Ago

Willys-Overland Motors, Inc., has reported that earnings during the fiscal year ended last Sept. 30 were $3,423,710, or about $3½ million less than for the previous fiscal year. Total sales for the period were $142,362,944, compared with $172,346,360 for the previous year. Working capital increased 14.4 per cent over the previous year to $25,108,011 with cash and government securities up 20.9 per cent to more than $20.4 million.

Greig Retires as Head of Ford of Canada

Douglas B. Greig has retired from his post as director and president of Ford Motor Co. of Canada, Ltd. He is succeeded by Rhys M. Sale, previously executive vice president. Mr. Greig was associated with the company for more than 30 years, and was made president in 1946. Mr. Sale has been with Ford 34 years and was named executive vice president in 1948.

U. S. Rubber Buys Chemical Div. from Glenn L. Martin

The United States Rubber Co. has purchased the Chemicals division of the Glenn L. Martin Co., according to a joint announcement. The rubber company will acquire all assets of the division, including the Marvinol vinyl resin plant at Painesville, O., laboratory equipment in Baltimore, patents and the trade name Marvinol. The business

RIDES THE RAILS

Known as the Hy-Rail, this car, announced by the Fairmount Railway Motors, Inc., Fairmount, Minn., provides on-track transportation for men and equipment, and can also be operated on the highway. Hydraulically controlled guide wheels serve to position the car on the rails, and normally the full load is carried on the pneumatic tires. The car has a four-cyl, 63-hp engine, with either two wheel or four wheel drive as required.

will become a part of the Naugatuck Chemical division of the rubber company. The Painesville plant will continue to make Marvinol vinyl resin for sale to manufacturers of plastic products. Through the sale of its Chemicals division, the Martin company completes its program of concentration in the aviation field, by divesting itself of all interests not directly concerned with the manufacture of airframes, special weapons and closely related products.

United States Rubber said that the purchase is part of a long-range program to expand its activities in the chemical field.

Ferry Made President of Packard

Hugh J. Ferry has been promoted from executive vice president to president of the Packard Motor Car Co. He succeeds George T. Christopher who has retired to his farm in Tipp City. Mr. Ferry was made executive vice president last Oct. 5 when Mr. Christopher announced that he would retire at the end of 1949. Mr. Ferry will continue to serve as treasurer, coincident with his duties as president of Packard. Col. J. G. Vincent, formerly vice president in charge of engineering, will succeed Mr. Ferry as executive vice president, and William H. Graves, vice president and engineering director, will continue as administrative head of the engineering division.

J. S. Hildreth Chairman of ASTE Economics Panel

On April 10, opening night of the Industrial Cost-Cutting Exposition in Philadelphia, a panel of the nation's leading economists under the sponsorship of the American Society of Tool Engineers is slated to discuss and attempt to chart the U. S. industrial future. Arrangements for this vital meeting, the ASTE has announced, are in the hands of a committee of publishers with J. S. Hildreth, president, Chilton Co., Philadelphia, as chairman, and including Robert B. Luchars, president, Industrial Publishing Co., New York, and Earl L. Shaner, chairman of the board, Penton Publishing Co., Cleveland.

1949 MOTOR VEHICLE FACTORY SALES FROM U. S. PLANTS*

	Passenger Cars	Trucks	Buses	Totals 1949	Totals 1948
Total—Six Months	2,377,945	613,006	3,331	2,994,284	2,488,373
Total—Third Quarter	1,575,124	286,587	1,181	1,862,892	1,349,445
Total—Nine Months	3,953,069	899,595	4,512	4,857,176	3,837,819
October	487,891	84,704	322	572,917	491,803
November	381,951	72,749	308	455,008	468,822
Total—Eleven Months	4,822,911	1,057,048	5,142	5,885,101	4,798,444

1949 FACTORY SALES TO DOMESTIC AND FOREIGN MARKETS*

	Passenger Cars		Trucks		Buses	
	Domestic	Foreign	Domestic	Foreign	Domestic	Foreign
Total—Six Months	2,291,023	86,922	536,247	76,761	2,894	437
Total—Third Quarter	1,537,906	37,218	257,903	28,684	1,093	88
Total—Nine Months	3,828,929	124,140	794,150	105,445	3,987	525
October	476,461	11,430	76,584	8,120	275	47
November	373,838	8,113	66,090	6,659	279	29
Total—Eleven Months	4,679,228	143,683	936,824	120,224	4,541	601

* Data from Automobile Manufacturers Association.

Production Stepped Up on Automatic Drives

Automatic transmissions appear to be gaining in popularity at a steady pace. Packard has announced that its entire January production will be equipped with Ultramatic drive in order to reduce the backlog of accumulated demand for the unit. Enough cars with standard transmissions are in dealers' stocks to take care of the demand for that type. Dodge has also announced that it is substantially increasing production of its Gyro-Matic transmission to keep up with increased demand for the unit. The division is making a substantial expenditure for new tooling to produce the additional transmissions.

GM Output in 1949 Smashes All Previous Records

Smashing all previous records, GM's U. S. and Canadian production for 1949 totaled 2,771,194 cars and trucks, about 410,000 units better than 1941, the next best year in its history. Output in 1949 was much greater than 1948's total of 2,147,397 units. Cars built in 1949 amounted to 2,269,459, and trucks totaled 501,375.

Ford Expects Partial Output at Buffalo Plant in April

Production on a partial basis at the new $35 million pressed steel plant of the Ford Motor Co., being constructed near Buffalo, N. Y., will get underway early in April. The plant will employ about 3900 workers on two eight-hour shifts. Alton J. Hole, who will manage the plant, said that three of the plant's 19 stamping assembly lines are expected to be operating next June. Peak production will be reached about April, 1951, he added. At that time the new Ford plant will be turning out virtually all of the bodies used in Ford cars, he explained. Bodies for Mercury and Lincoln automobiles, also manufactured by the Ford Motor Co., will continue to be stamped at plants at Dearborn, Mich., he said.

Rema Buys Empire Steel From Studebaker

Sale of the Empire Steel Corp., Mansfield, O., by the Studebaker Corp. to the Rema Co., Dover, O., for a reported $5 million has been announced. The Rema company is a new corporation. It was reported that the new owners will spend $10 million in an improvement program on Empire Steel, which has been a chief industry in Mansfield since 1912 and employs about 1150. Announcement of the sale by the South Bend automobile manufacturer was made by D. W. Frease, president of Empire Steel, and vice president of Reeves Steel Corp. of Dover. Studebaker bought Empire Steel in November, 1947, for $7,430,000, thus acquiring a source of steel for its manufacture of automobiles and trucks at a time when steel was in short supply.

British Car Exports Hit Record in November

Great Britain exported more cars and commercial vehicles in November, 1949, than in any other month in the history of the industry. The total was more

than the country produced in a month before the war. Almost 28,000 cars and over 9000 trucks and buses left Britain in November. Nearly 1400 vehicles went to the United States, the first time that the number had exceeded 1000 since last January. Car shipments to Canada totaled more than 4250 units. During the nine months up to the end of September, 1949, the total number of cars exported was 178,866, and in the same period commercial vehicles of all types (except agricultural tractors) shipped overseas reached the grand total of 66,212.

New Group Attempting to Save Tucker

Hope dies hard. A report from Chicago states that a new organization, National Tucker Stockholders Association, Inc., is attempting to reorganize the Tucker Corp. on a going basis under new management. The president of the group states that it will seek permission from the United States court and the trustees to operate the plant under the name of Tucker Motors, Inc.

Fruehauf Trailer Sells Kansas City Plant

The Fruehauf Trailer Co. has sold its Kansas City, Kansas, plant, which had been used for the manufacture of truck bodies. The plant was sold to the Mutual Life Insurance Co. of New York, which in turn has leased it to Jones & Laughlin Steel Corp. Equipment in the plant will be transferred to the main Fruehauf factory at Avon Lake, O.

NEW 1950 DE SOTO

The new 1950 De Soto has new peak-crowned rear fenders; a wider, larger lower rear window, a deeper, lower bumper; and a newly-designed, lower grille. The car has new and larger hydraulic brakes, and is powered by a 112 hp engine.

Prices Raised on Tires for New Cars and Trucks

The pressure of higher costs for automobile manufacturers increased when major tire companies announced a boost of at least five per cent on passenger car and truck tires sold as original equipment. The five per cent minimum indicates that the increase will be even larger for some sizes and types of tires.

Standards Group Elects Three New Directors

The American Standards Association has elected three new members to its board of directors effective Jan. 1, 1950, for a term of three years. Maurice Stanley, chairman of the board, the Fafnir Bearing Co., represents the Anti-Friction Bearing Manufacturers Association, Inc.; B. S. Voorhees, vice president of the New York Central System, represents the Association of American Railroads; and Colonel J. G. Vincent, vice president, Packard Motor Car Co., represents the Automobile Manufacturers Association. In addition, E. E. Potter, vice president of the General Electric Co., has been named by the National Electrical Manufacturers Association to fill out the unexpired term of Clarence L. Collens, who has just retired as chairman of the Reliance Electric and Engineering Co.

Fairchild Calls Pilotless Unit Guided Missiles Division

The name of the Pilotless Planes Div., Fairchild Engine and Airplane Corp., located at Farmingdale, N. Y., has been changed to Fairchild Guided Missiles Div., according to Richard S. Boutelle, Fairchild, president.

New Cylindrical Car Storage Battery Invented

Invention of a space and material saving cylindrical storage battery for automobiles by John L. Rupp has been revealed. The inventor is vice president in charge of engineering of the Gould Storage Battery Corp., Depew, N. Y., a subsidiary of the National Battery Co., at St. Paul, Minn., to which he has assigned patent rights. One of the principal advantages of the new battery is that reportedly its manufacture will require the use of less lead. Shaped like a large paint can, the newly de-

NEW 1950 PLYMOUTH

Included among changes in the new 1950 Plymouth are a completely new grille, larger redesigned bumper, and new ornamentation. The complete Chrysler line for 1950 was described in detail on page 53 of the Jan. 1st issue AUTOMOTIVE INDUSTRIES.

Official Department of Defense Photo

RESCUE BY ROTOR

This new search, rescue, and liaison helicopter, the USAF H-19, built by the Sikorsky Aircraft Div., United Aircraft Corp., Bridgeport, Conn., has a 10-ft long, 5½-ft wide, 6-ft high cargo compartment. The all-metal, three-bladed rotor atop the H-19 is driven by a Pratt and Whitney R-1340 radial engine rated at 600 horsepower on take-off.

signed storage battery has three concentric cells within a single cylindrical casing.

Total Airframe Weight in 1949 Was 34.6 Million Pounds

Total deliveries of military and civil aircraft in 1949 measured in terms of airframe weight are estimated at 34.6 million lb, according to a joint study prepared for the Dept. of Commerce by the Office of Domestic Commerce and the Civil Aeronautics Administration. There has been a consistent increase in airframe weight delivered each year by the aircraft industry since 1947. Deliveries of military and civil aircraft in terms of airframe weight amounted to 38.4 million lb in 1946, 29.2 million lb in 1947, and 34.5 million lb in 1948. Dollar value of all shipments by airframe, engine and propeller companies in 1949 is estimated at $1700 million. In 1948, estimated dollar value was $1450 million.

Dodge Holds Price Line on 1950 Models

Prices of the 1950 model Dodge have remained unchanged as compared with the previous models, according to L. L. Colbert, president of the Dodge Div. of Chrysler Corp. Fluid drive will be standard equipment at no extra cost on all models. Dodge and the other Chrysler divisions were the only automobile manufacturers last year, with the exception of Studebaker, that did not reduce prices.

Duffy Made Vice President of Ford

Irvin A. Duffy, director of purchasing for the Ford Motor Co., has been elected a vice president and member of the policy committee. He will continue to serve on the staff of D. S. Harder, vice president—manufacturing.

Government Dissolves Rubber Patent Pool

The rubber industry has hailed dissolution of the government's war-time synthetic rubber patent pool as a major step in the return to competition among the members of the industry. RFC has announced that the patent pool officially has been terminated in line with the Rubber Act of 1948. The feeling in the industry is that with the patent pool arrangemen ended, the incentive will be greater for discovery and production of better synthetic rubbers.

Ford to Build Engine Plant and Foundry in Cleveland

Ford will build a new foundry and engine plant this year near Cleveland. It has been known for some time that the company is planning a new engine plant. It is also known that Ford is strongly in favor of decentralization and Cleveland offers an excellent location for bringing in ore from the northern ranges and steel from the Buffalo operation. It would also be reasonably close to the new Cincinnati plant where the automatic transmission will be built.

Oil Firms Aim to Increase Accessories Market

Oil companies are making ambitious plans to capture a much larger share of the tire, battery, and accessories market next year. Most of the major oil concerns are optimistically pushing campaigns to bring the total share of the market in 1950 to a level higher than prevailed in 1947 when it amounted to nearly $300 million. . It is estimated that service stations in 1949 sold about $275 million worth of such products.

METAL BONANZA

The new Beechcraft Model 50 Twin-Bonanza, made by The Beech Aircraft Corp., is powered by two 260-hp Lycoming engines. The all-metal, six place plane has a cruising speed estimated at over 180 mph at a range of about 1000 mi. Present estimates indicate the price of this new Beechcraft will be about $30,000 as delivered complete.

INDUSTRIES

Complete Classifications for 1950 Mobilgas Canyon Run

Classification divisions of cars eligible to enter the 1950 Mobilgas Grand Canyon Run, scheduled for Feb. 15, 16, 1950, have been completed. The division classification of the cars is as follows:

A. 1—Willys (Special four-cyl class)
B. 1—Chevrolet
2—Ford Deluxe 8
3—Plymouth
C. 1—Dodge
2—Kaiser Special
3—Nash Statesman
4—Pontiac
5—Studebaker Champion
D. 1—Buick Special, Series 40
2—De Soto
3—Hudson Pacemaker
4—Mercury
5—Nash Ambassador
6—Oldsmobile 88
7—Studebaker Commander
E. 1—Buick, Series 50
2—Chrysler Windsor
3—Hudson Super Series
4—Oldsmobile 98
5—Packard 8
6—Studebaker Land Cruiser
F. 1—Buick Roadmaster 70 Series
2—Chrysler New Yorker
3—Frazer
4—Hudson Commodore Series
5—Lincoln
6—Packard Super
G. 1—Cadillac Series 61
2—Kaiser Virginian
H. 1—Cadillac Series 62
2—Lincoln Cosmopolitan
I. 1—Cadillac Series 60 Special
2—Packard Custom
J. 1—Cadillac Series 75
2—Chrysler Crown Imperial

Among the 32 entries received for the contest are the following:

CAR	ENTERED BY	LOCATION
Cadillac	Riding's Motors	Long Beach
Cadillac	Riding's Motors	Long Beach
Cadillac	Ronald E. Moran, Inc.	Hermosa Beach
Chrysler New Yorker	Lloyd Gregg, Inc.	No. Hollywood
Chrysler Windsor	Lysle Greenman, Inc.	Los Angeles
De Soto	McNeil-Stanley, Inc.	Los Angeles
Ford	Al Stuebing	Hollywood
Frazer	Kaiser-Frazer Corp.	Willow Run
Kaiser	Kaiser-Frazer Corp.	Willow Run
Lincoln Cosmopolitan	Deaton Motor Co.	Beverly Hills
Lincoln Sport Sedan	Bob Estes	Inglewood
Mercury	Art Hall, Inc.	Long Beach
Nash Ambassador	Nash California Co.	Los Angeles
Nash 600	Nash California Co.	Los Angeles
Nash Standard	Nash California Co.	Los Angeles
Oldsmobile 88	Oldsmobile Div.	Detroit
Oldsmobile 98	Oldsmobile Div.	Detroit
Packard	Earl C. Anthony	Los Angeles
Super 8	Earl C. Anthony	Los Angeles
Plymouth	Paul Bobst Co.	Los Angeles
Studebaker Champion		Los Angeles
Studebaker Commander	Studebaker Metropolitan Dealers Association	Los Angeles
Studebaker Land Crsr.		
Willys Jeepster	Willys Overland	Factory Entry
Willys Jeepster	Willys Overland	Factory Entry
Willys Jeepster	Willys Overland	Factory Entry

Motor Products Corp. Promotes Three

The Motor Products Corp. has promoted three of its top executives. L. G. Jacques, formerly vice president and general manager, has been made executive vice president; D. J. Bracken has been promoted from vice president in charge of manufacturing to vice president and general manager of the automotive division, and L. J. Sorensen, who had been serving as treasurer and controller, was elevated to vice president and general manager of the Deepfreeze appliance division.

FLYING BANANA

The new all-metal fuselage Piasecki HRP-2 tandem rotored transport helicopter, primarily a refinement of the Navy's Piasecki HRP-1 (the so-called "Flying Banana") has a fuselage length of 54 ft. With the lifting rotors at each end of the fuselage and the engine toward the rear, it has a clear and unobstructed cabin space 20 ft long by 5 ft 6 in. wide and 5 ft 6 in. high

Bellanca Demonstrates New Personal Plane

The Bellanca Aircraft Corp., New Castle, Del., has demonstrated a new personal plane called the Cruisemaster. Powered by the 190-hp Lycoming engine, it is intended for both business and personal use. The plane carries four persons and has a cruising speed of 180 mph.

Fitzjohn Establishing a New Canadian Factory

The Fitzjohn Coach Co., Muskegon, Mich., is now establishing a Canadian factory for the production of Fitzjohn buses at Brantford, Ontario. A total of 42,000 sq ft of floor space will be used to produce Fitzjohn coaches for the Canadian market. From 75 to 100 people will be employed.

GM Sells Holdings in Chemical Firm

GM has concluded negotiations for sale of its 49 per cent interest in Kinetic Chemicals, Inc. to E. I. du Pont de Nemours & Co. Approval of the sale, said to involve approximately $9.7 million, is expected from SEC.

Illinois Tool to Make Boots Nuts

The Illinois Tool Works has set up complete manufacturing facilities for producing the Tri-Lok and Hex-Lok nuts in their Elgin, Ill., plant. Illinois Tool has secured an exclusive license from the Boots Aircraft Nut Corp., Stamford, Conn., to make the nuts.

Badgley Retires from Delco-Remy

O. V. Badgley, GM vice president and general manager of the Delco-Remy Div., has retired. He will be succeeded by H. D. Dawson, who had been assistant general manager since July, 1947.

Second Welding Conference in Detroit, April 5-7

The second Conference on Electric Welding, to be sponsored by the American Institute of Electrical Engineers in cooperation with the American Welding Society and the Industrial Electrical Engineers Society of Detroit, will be held in Detroit, Mich., from April 5 to 7.

Bonded Brake Linings Win Another Convert

Another car manufacturer will soon convert to bonded brake linings, at least on a partial basis. It is understood that initially about 10 per cent of production will carry the cemented linings which are attached in a somewhat different manner than is now employed by Chrysler Corp. and Chevrolet.

John G. Wood Retires From Chevrolet

John G. Wood, formerly chief engineer of GM's Chevrolet Motor Div., and more recently on the executive staff for engineering serving directly under T. H. Keating, general manager, has retired.

Take a look at something wonderful YOU CAN'T SEE!

When you examine and admire the new models at the winter shows, you'll see many of the devices that make automobiles so dependable today. But not all of them!

You can't see the amazingly accurate New Departure ball bearings beneath the gleaming chrome and lacquer of the new cars. Located where they are, by engineers who perform new "miracles" each year, these *ball* bearings carry the loads, lick wear and friction, and keep moving parts moving, precisely in position, for years and years.

New Departure, world's largest maker of ball bearings, welcomes the increasing acceptance by engineers of the fact that "nothing rolls like a ball."

nothing rolls like a ball...

NEW DEPARTURE
BALL BEARINGS

89

NEW DEPARTURE • DIVISION OF GENERAL MOTORS • BRISTOL, CONNECTICUT

Men in the News

Current Personnel Appointments and Changes at Plants of Automotive Manufacturers and Their Suppliers.

Ford Motor Company—**Charles L. Waterhouse** has been appointed to the newly created position of Manager of the Styling Dept. The election of **Irving A. Duffy**, Director of Purchasing, as a Vice-President and member of the policy committee has been announced.

Hudson Motor Car Co.—The appointment of **George R. Browder** as Director of Advertising and Merchandising has been announced. Mr. Browder succeeds **M. M. Roberts** who is retiring.

Chrysler Corp., Export Div.—**L. W. Krass** has been appointed to the post of General Traffic Manager of the division, and **B. J. Wistow** has been made Traffic Manager.

Dennis Brothers, Ltd. (England)—**V. W. Pilkington** has joined the company in the capacity of Engineering Director.

Renault Motor Co. (France)—**Henry Lowe Brownback** has been made American Technical and Commercial Adviser to the company.

Willys-Overland Motors, Inc.—The appointments of **Don H. Smith** as Asst. Sales Promotion Manager and of **George H. Gruenwald** as Asst. Advertising Manager, have been announced.

Mack Trucks, Inc.—**John J. Byrne** has been made Manager of national accounts for Mack-International Motor Truck Corp.'s Southern Division, with headquarters in Atlanta.

United States Steel Corp.—**Harvey B. Jordan**, formerly Vice-President in charge of Operations, American Steel & Wire Co., has been elected President of this U. S. Steel subsidiary. He succeeds **Clifford F. Hood**, who has been elected President of Carnegie-Illinois Steel Corp. **James E. Lose**, formerly Vice-President in charge of Operations, has been elected Executive Vice-President of Carnegie-Illinois. **Charles R. Cox** has resigned as President of Carnegie-Illinois to become President of Kennecott Copper Corp. He succeeds the late **E. T. Stannard**.

General Electric Co.—**Dr. Zay Jeffries**, Vice-President of the Chemical Dept., has retired.

General Electric Co.—Rear Admiral **Walter S. Macauley**, U.S.N. (Retired) has been appointed Asst. Executive Engineer in the Knolls Atomic Power Laboratory, West Milton, New York.

Thermoid Company—**George Lamson** has been named Manager, Automotive Replacement Division.

Allegheny Ludlum Steel Corp.—**H. G. Batcheller**, formerly company President, was elected Chairman of the Board, with **E. B. Cleborn**, Executive Vice-President, succeeding him as President. **Edward J. Hanley** has been made Executive Vice-President. **Clark W. King** was elected Treasurer, succeeding Mr. Hanley in that position. **T. Ames Wheeler** was elected to the newly created office of Controller. The resignations of **William E. Ruder** and **John W. Belanger** as Directors was announced. Three new Directors were elected as follows: **Clark W. King, Russell M. Allen** and **William J. Kyle.**

Borg-Warner Corp.—The appointment of **Robert A. Anderson** as Vice-President and Works Manager of the Ingersoll Steel Div., has been announced.

Walker Manufacturing Co.—**Randall Snow** has been named Asst. General Sales Promotion Manager. **Robert Schnetz** has been added to the company's Sales Promotion Staff.

National Association of Manufacturers—**C. A. Putnam** is the new President of the association. He is President of the Marken Machine Co.

Perfect Circle Corp.—Announcement has been made of the promotion of **Norman Rothenheber** to the position of Regional Manager of Region I, with headquarters in Philadelphia.

(*Turn to page 96, please*)

Necrology

Clarence A. Raftrey, 52, works manager, GM's Cadillac Motor Div., died on Dec. 30 in Detroit, Mich.

Charles Osgood Drayton, 58, vice president in charge of sales, American Screw Co., died on Dec. 19.

Elbridge F. Bacon, 51, assistant chief engineer, GM's AC Spark Plug Div., died Dec. 15.

Alfred Eckdahl, 51, past president of the National Motor Parts Association, died recently as a result of a traffic accident. Mr. Eckdahl was a member of the NMPA's board of directors at the time of his death, and owner of the Eckdahl Auto Parts Co.

Andrew L. Johnson, 89, inventor of agricultural machines, died recently at his home in Los Angeles.

Clare N. Suffill, 53, sales promotion manager, Fisk Tire Div., U. S. Rubber Co., died on Dec. 27 in White Plains, N. Y.

Gerrit Van Daam, 56, who invented airplane equipment used by the United States in two world wars, died Dec. 20 in Buffalo, N. Y.

Labert St. Clair, executive assistant, National Automobile Dealers Association, died Dec. 17 at Vienna, Va.

Ernest F. Stecher, 55, general traffic manager, Stewart-Warner Corp., died Dec. 19 in Chicago.

Joel E. Brown, 73, president, Don Lee Motors Corp., and an automotive pioneer, died on Dec. 22 in Los Angeles, Calif.

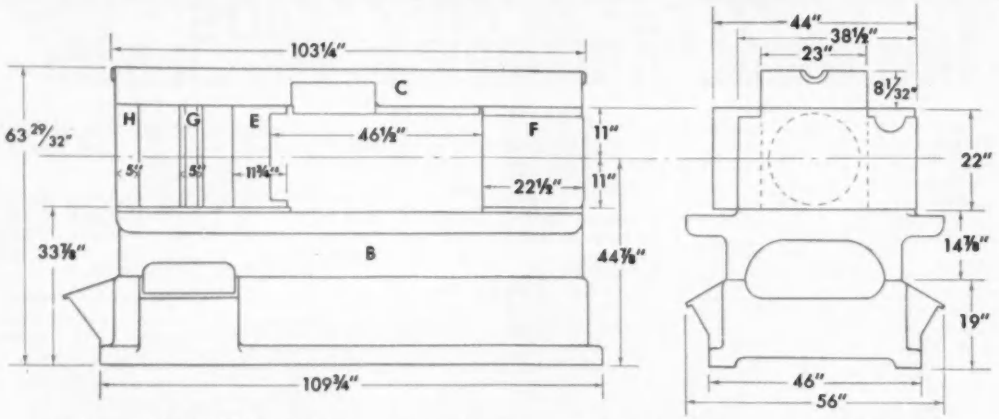
F. Carroll Taylor, 65, general counsel and a director, Yale & Towne Manufacturing Co., New York City, died in Stamford, Conn., on Dec. 23.

CALENDAR

OF COMING SHOWS AND MEETINGS

Conventions and Meetings

Truck-Trailer Mfrs. Assoc., Annual Convention, Edgewater Park, Miss. ..... Jan. 16-18
Plant Maintenance Show, Cleveland ..... Jan. 16-19
Nat'l Auto. Dealers Assoc., Atlantic City ..... Feb. 5-8
Nat'l Auto. Access. Mfrs. Assoc. Annual Expos., New York City. Feb. 6-10
Automotive Electric Assoc., Conference, Chicago ..... Feb. 10-17
Pacific Automotive Show, San Francisco ..... Feb. 16-19
Chicago Auto Show, Chicago ..... Feb. 18-26
ASTM Spring Mtg., Pittsburgh ..... Feb. 27-Mar. 3
Amer. Road Builder's Assoc., Cincinnati ..... Mar. 6-9
SAE Passenger Car, Body & Production Mtg., Detroit ..... Mar. 14-16
Geneva Motor Show, Geneva, Switzerland ..... Mar. 16-26
Southwest Automotive Show, San Antonio, Texas ..... Mar. 23-26
Nat'l Production Expos., Chicago .. Apr. 4-8
Amer. Inst. Elec. Engrs. Conf. on Elec. Welding, Detroit ..... Apr. 5-7
Midwest Power Conference, Chicago ..... Apr. 5-7
Amer. Society Lubrication Engineers Convention, Detroit ..... Apr. 10-11-12
Amer. Soc. Tool Engineers Industrial Expos., Phila. ..... Apr. 10-14
Society of Motor Mfrs. & Traders British Auto. & Motorcycle Show, New York City ..... Apr. 15-23
SAE Aeronautic & Aircraft Eng. Display, New York City ..... Apr. 17-19
Metal Powder Assoc. Annual Metal Powder Show, Detroit ..... Apr. 25-26
3rd Highway Transportation Congress, Washington ..... Apr. 26-27
International Motor Show, Turin, Italy ..... May 4-14
Mid West Automotive Show, Chicago ..... May 11-14
Automotive Engine Rebuilders Assoc. Annual Convention, St. Louis. May 18-19
International Trade Fair, Toronto ..... May 29-June 9
Amer. Electroplaters' Soc. Convention, Boston ..... June 12-16
A.S.T.M. Annual Mtg., Atlantic City ..... June 26-30
International Trade Fair, Chicago. Aug. 7-19
Instrument Soc. of Amer. Conf. & Exhibit, Buffalo ..... Sept. 18-22



H, G, E — HEADSTOCK SUPPORTS Weight — 1233 lbs. | **B — BASE** Weight — 6655 lbs. | **C — TOP BED** Weight — 1232 lbs. | **F — GEAR BOX** Weight — 841 lbs.

BE VALUE WISE OR OTHERWISE

True of any "means goods," the purchase price of any Multiple Spindle Bar Automatic is only relative. It is "high" or "low" on the basis of the total cost of its total services, compared to other brands. Important items of total cost are those of operation and maintenance.

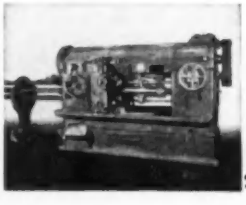
Machine analysis will invariably disclose the low cost operation and maintenance features that have been "built into" a machine. Such features are built into the CONOMATIC, beginning with its very foundation. The figures above substantiate the claims below.

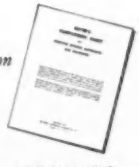
THE 1½" Six Spindle MACHINE FRAME:

1. **Provides greater capacity for handling work.** — *The Frame provides a LONGER TOOLING AREA, with more positions and accommodations for tooling and attachment applications, with more clearance and conveniences for faster tool setting, than are provided by any other "automatic."*

2. **Provides better support to work and tools.** — *The Frame provides better support and alignment to headstock members, tool slides, and other units and mechanisms, with BASE SUPPORT CLOSER TO THE WORK AXIS, with BETTER TOP BED SUPPORT TO SHORTER, "WEAVE PROOF," UPRIGHTS, and, with larger, heavier, and stronger, Top Bed and Base, than are provided by any other "automatic."*

3. **Provides greater accessibility for lower cost operation and maintenance.** — *The Frame provides a more orderly arrangement of, and easier access to, all units, mechanisms, parts, and adjustments, than can possibly be provided by any "automatic" that does not have a VISIBLY ACCESSIBLE, NON-INTERFERING CAM SYSTEM.*

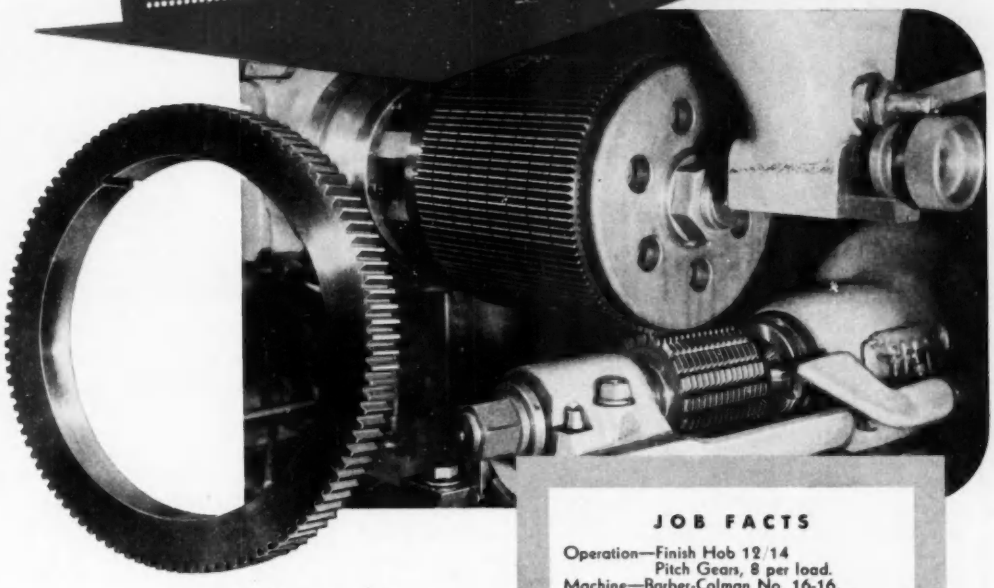


Buyer's Comparison Chart will guide you to full information

A Comparison of ALL Automatics is in Favor of Cone

Conomatic

CONE AUTOMATIC MACHINE COMPANY, INC.
WINDSOR, VT., U.S.A.

MORE GEARS IN LESS TIME!



With

BARBER-COLMAN "*MULTITHREAD*" HOBS

Finish, production, tool life — all 3 have improved with a changeover to Barber-Colman *"Multithread"* hobs on this finish hobbing operation. The use of *"Multithreads"* depends on machine conditions and the particular characteristics of the gears to be cut. Under the proper conditions, as in this case, more gears are produced in less time, with substantial production savings. This job, for example, shows 25% better finish, 24 more gears per hob setting, 10 more settings per sharpening, and production time cut from 95 to 60 minutes per load.

JOB FACTS

Operation—Finish Hob 12/14 Pitch Gears, 8 per load.
Machine—Barber-Colman No. 16-16.
Hob—Barber-Colman Ground "Multithread" Hobs.
Material—Steel forgings.
Feed—.054"/rev. of work Speed—139 RPM
Fl-to-Fl—60 minutes per load.
Accuracy—Roll with master gear. Kickout within .002".

We are anxious to demonstrate what *"Multithreads"* can do for other production hobbing jobs, and we invite questions and job specifications. Ask your Barber-Colman representatives for an analysis of *"Multithreads"* on your jobs.

METHODS ENGINEERS!

Get this free data on hob performance and accuracy, a complete case history record, without obligation. Send request on company letterhead for File No. 7604

Barber-Colman Company

GENERAL OFFICES AND PLANT, 7604 LOOMIS ST., ROCKFORD, ILLINOIS, U. S. A.

Said Mr. Hamilton* to Mr. Jones**

*Typical New Britain Sales Engineer
**Typical Industrial Executive

I only wish I could see my way clear to buy some new equipment. Some of my stuff's pretty old. What do they save on a job like that?

Well, first off they save operators. Then there's floor space and maintenance. Of course, you've got to consider the savings made on tooling and set-up of five machines against one. All in all they make the piece a lot cheaper on one automatic . . . and maintain the production rate and quality, too.

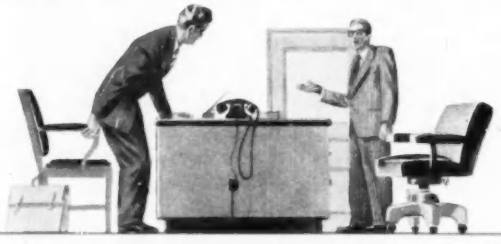
How much down-time for loading? That piece is over a foot long.

We licked that problem with an automatic, magazine-fed stock reel. It automatically loads all six spindles in less than a minute.

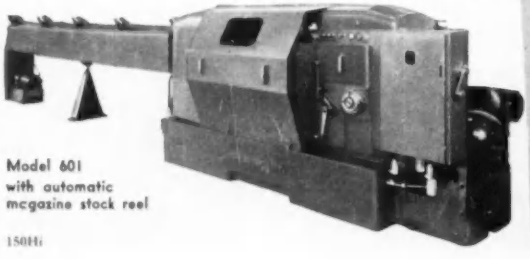
That sort of performance is impressive. I've been reading that our national average age of machines is on the way up again.

And we can't maintain the productivity we must have with over-age machines. This "modernize or die" business is no mere slogan!

What say we take a stroll through the shop right now. You might spot a job where we could save with automatic methods.



Call on your New Britain Sales Engineer to help you discover profit opportunities in metal cutting. Meanwhile, let us send you "It Can Be Done" with up-to-date cost histories on specific pieces.



Model 601
with automatic
magazine stock reel

1501Hi

NB

NEW BRITAIN

Automatics

THE NEW BRITAIN MACHINE COMPANY
NEW BRITAIN-GRIDLEY MACHINE DIVISION
NEW BRITAIN, CONNECTICUT

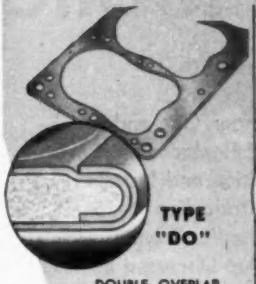
The Pioneer's Skill available only in Victor Sealing Products

It's a matter of record! 116 basic patents attest Victor's exclusive pioneering and development of today's highly efficient gasket and oil seal designs.

From Victor's pioneering come the skill and sound knowledge that back the accuracy of each Victor recommendation, and make each Victor product a superior sealing product. It's your assurance of extra value performance in every application of Victor gaskets and oil seals.

Victor Mfg. & Gasket Co.,
P.O. Box 1333, Chicago 90, Ill.

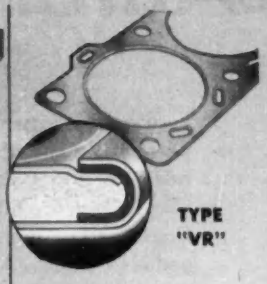
TYPICAL VICTOR DEVELOPMENTS ... IN GASKETS



TYPE "DO"

DOUBLE OVERLAP CONSTRUCTION in top and bottom layers of copper or steel, formed around cylinder openings, and encasing asbestos.

Patent 1,815,601



TYPE "VR"

STEEL GROMMET REINFORCEMENT around cylinder openings, with copper or steel layers encasing asbestos.

Patent 1,748,582

VICTOPRENE GROMMET AT OIL HOLE

Resilient synthetic rubber grommet effectively seals oil transmitted under pressure to operating parts of engine, or coolants.

Patent 2,395,243

... IN OIL SEALS

TYPE "H"

MOLDED VICTOPRENE sealing element bonded to metal shell; double outer wall construction; spring loaded.

Patent 2,240,332

TYPE "K"

Molded hammerhead design VICTOPRENE sealing element giving controlled flexible lip pressure, and bonded to preformed metal washer. Double outer wall construction; spring loaded.

Patents 2,405,279 and 2,319,067

SPECIAL SPLIT SEAL

Leakproof seal for rear bearing crankshaft of internal combustion engines. Fabric-faced Victoprene sealing element with embedded spring wire, molded to two semicircular steel channels.

Patent 2,209,578

116 U.S. PATENTS ISSUED TO VICTOR

GASKETS

1,241,587	1,843,297
1,358,617	1,846,401
1,398,612	1,846,402
1,472,133	1,853,175
1,626,962	1,862,703
1,692,857	1,864,328
1,740,780	1,864,854
1,748,582	1,893,881
1,768,995	1,904,651
1,770,548	1,911,484
1,771,596	1,913,736
1,779,616	1,932,538
1,789,594	1,932,539
1,789,595	1,956,183
1,789,770	1,957,798
1,793,423	1,974,633
1,798,246	1,985,473
1,804,574	1,985,475
1,814,283	RE-19,874
1,815,601	2,021,571
1,815,602	2,026,854
1,819,694	2,070,918
1,823,284	2,092,231
1,823,341	2,127,372
1,823,342	2,130,110
1,828,471	2,157,102
1,829,248	2,209,230
1,835,356	2,211,247
1,838,496	2,289,620
1,839,336	2,349,235
	2,395,243

OIL SEALS

1,938,648	2,210,748
1,985,474	2,210,823
1,992,790	2,212,291
2,022,304	2,213,116
2,040,379	2,224,449
2,055,917	2,227,771
2,055,918	2,233,147
2,061,153	2,233,359
2,070,126	2,233,902
2,071,403	2,235,735
2,073,768	2,240,252
2,092,237	2,240,332
2,114,908	2,248,761
2,116,240	2,289,607
2,145,928	2,289,608
2,149,147	2,289,659
2,161,767	2,301,993
2,166,293	2,319,067
2,167,603	2,330,104
2,172,325	2,334,349
2,173,006	2,348,586
2,185,790	2,348,587
2,191,873	2,367,403
2,208,482	2,367,411
2,209,578	2,405,279
2,209,750	2,468,247
2,210,723	2,483,988
	2,485,011

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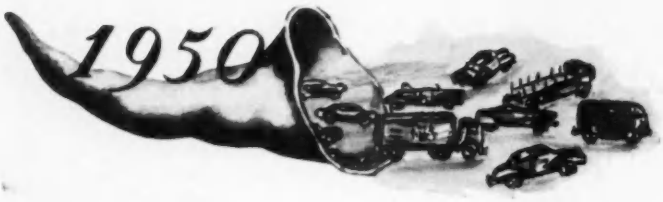


By Leonard Westrate

Automobile

Forecast of Passenger Car and Truck Output, Volume of Replacement Parts and Accessories, Price and Installment Credit Trends, Introduction of Small Light Cars, Automatic Transmissions and New Engines Are Discussed In This Article by Leonard Westrate. A Good Year Also Is Ahead for the Tractor and Aircraft Industries. The Following Two Articles in This Issue by Robert McLarren and H. E. Everett Tell Why.

ALL the leaders of the automobile industry are looking for another very good year in 1950, but just how good in relation to the record breaking performance in 1949 still is in doubt. There have been several opinions that in the first half of this year, the production rate of cars and trucks will be equal to or greater than that during the peak months of 1949, but few are willing to go beyond the half-year mark in their forecasts.

Generally, it is believed that the industry this year will continue on pretty much the stabilized basis that prevailed in 1949, when production and sales were well balanced and employment was high and relatively constant. U. S. population has increased 14 per cent since prewar days, national income is 200 per cent higher than in 1929, employment has jumped 30 per cent in the last decade, average age of cars on the road has increased about three years and trucks two years as compared with prewar, and replacement demand is greater than at any time in history. Annual replacement needs now are estimated at 2.7 million cars and 680,000 trucks, compared with 1,850 million cars and 349,000 trucks in the decade before the war.

Wrapping up the several opinions we were able to get, the consensus appears to be that total production for the year will probably fall a little short of the all-time record of 6.2 million made last year, possibly by five to 10 per cent. There seems to be more certainty about that in regard to trucks than is the case with passenger cars. Truck production is variously estimated at from about 900,000 to 980,000, as compared with approximately 1.125 million last year. Estimates on passenger cars range in the neighborhood of 4.5 million to 5 million plus, with some of the more optimistic holding that it is entirely possible to surpass the 1949 record of 5.075 million turned out in 1949.

Employment and Annual Payrolls at Automobile, Body and Parts Plants

	1941 (Est.)	1947	1948	1949 (Est.)
Average Hourly Earnings	$1.04	$1.47	$1.61	$1.70
Weekly Payrolls	$22,600,000	$37,300,000	$40,700,000	$43,100,000
Annual Payrolls	$1,180,300,000	$1,949,430,000	$2,127,500,000	$2,241,000,000
Number of Production Workers	570,000	649,000	658,000	656,000

A Prosperous 1950 for the Automotive Industries

Automobiles • Tractors • Aircraft

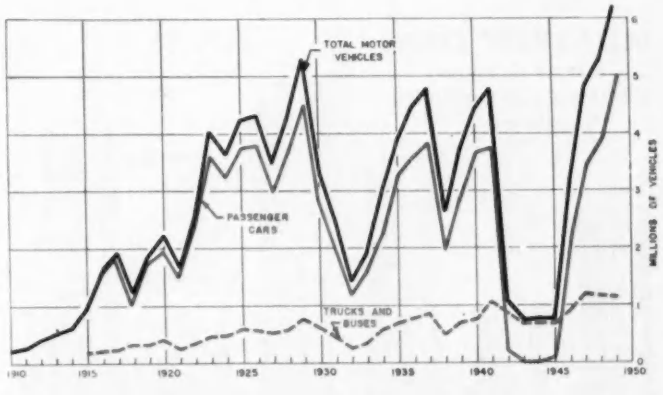
Production *Outlook Bright*

This year probably will see the Big Three regain their prewar share of the market for the first time since the war. In 1941, Ford, General Motors, and Chrysler accounted for 90.1 per cent of all sales, and it is highly likely that this year they again will reach that percentage. Last year, with materials in better supply, they reached about 86 per cent, compared with 80.3 in 1948. However, if production is as high as estimates indicate for 1950, the independents as a group still will have a good year, although not quite so good as in 1948.

The outlook for export markets for automotive products continues dim for this year. For the long pull, the industry is a little more optimistic in view of the known large demand for U. S. vehicles in all important foreign markets. However, with import restrictions sharply tightened during the latter months of 1949 by most nations, the short term outlook is not conducive to optimism. Only 160,000 cars and 130,000 trucks and buses, or a total of 290,000 vehicles, were sold abroad in 1949, a sharp drop from the 436,217 exported in 1948. Motor vehicle exports last year accounted for less than 4.7 per cent of total production. Passenger car exports amounted to 3.1 per cent, being lower only in 1940, 1941, and 1945. Percentage of trucks and buses sold abroad, however, almost hit a new low, accounting for only 11.55 per cent of total production. An important fact is that in 1949, the domestic market took about 97 per cent of the cars and more than 88 per cent of the trucks produced, or a total of 95.3 per cent of the highest total production on record, whereas in 1929, the former record year, only 86.3 per cent were sold at home.

The parts and accessories business for 1950 is expected to hold at about the same level as in 1949, when it amounted to approximately $2 billion, or a drop of 20 per cent under the peak set in 1948. However, when compared to the $718 million annual business in 1941, the highest prewar year, the parts business still is at a very high level.

Automobile prices, always a moot question, are even more unpredictable at this time. Toward the end of last year, there were some selective reductions that appeared to be a trend, but that was sharply arrested by increases in basic steel prices. Manufacturers have



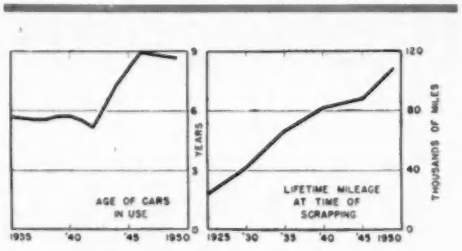
Production rates of trucks, buses, and passenger cars.

been studying their costs, but the consensus of qualified observers is that prices will go up very little, if any, although decreases will be prevented in some cases and any that do materialize will be less than would have been the case had steel prices not been raised. A realistic view would be that with the coming intense competitive market shaping up, it will be very difficult to raise prices.

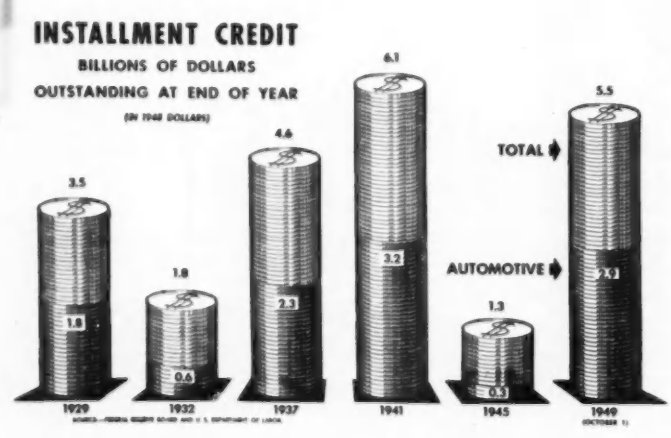
Automobile dealers are entering 1950 facing smaller profit margins and decreased earnings from the high levels of the last three years. The brunt of high production and stiff competition will fall on the dealers this year, and blood will run in that end of the business before the year is out. However, those with solid financial backing and good management should have a good year of high volume, although with reduced profit per unit. Factory-dealer relationships are going to get a bit more touchy this year, too, with dealers resisting the heavy flow of vehicles in the face of mounting competition. There will be more vociferous demands from the dealer body to cut production than have been heard already, and the usual complaints about packing territories and too many trucks and station wagons.

Accelerated activity in the fields of automatic transmissions and high compression engines should mean good business for suppliers of machine tools and equipment to the automobile industry this year. Several companies are at work on new engines which should reach the production stage in late 1950 and 1951, so that tooling orders should start coming in this year. Automatic transmissions will be either optional or standard equipment on practically every make of car in the next year or two, calling for a vast tooling program.

This year will see the first of the small light cars that have been talked about since the end of the war. Nash will be first with a 103 in. wheelbase, six cylinder model next Spring, followed by Kaiser-Frazer next Summer with a 100 in. wheelbase car, powered by an economy engine, possibly a four-cylinder type, with a six optional. It is extremely doubtful, however, that either will be a $1000 car, although they are designed to compete with Ford, Chevrolet, and Plymouth.



The chart at the left shows average age of cars now in use, while the average mileage of automobiles at time of scrapping is shown in the chart at the right.



In the field of labor, the prospect is for pension plans to spread throughout the industry as labor contracts come up for renewal. With the principle of pensions already established, the question now is not "if," but "how much?" Chrysler probably will be the next company to conclude such an agreement, and General Motors will open discussions in the Spring. The problem will be a difficult one for smaller companies, not only among the manufacturers of vehicles, but particularly for thousands of

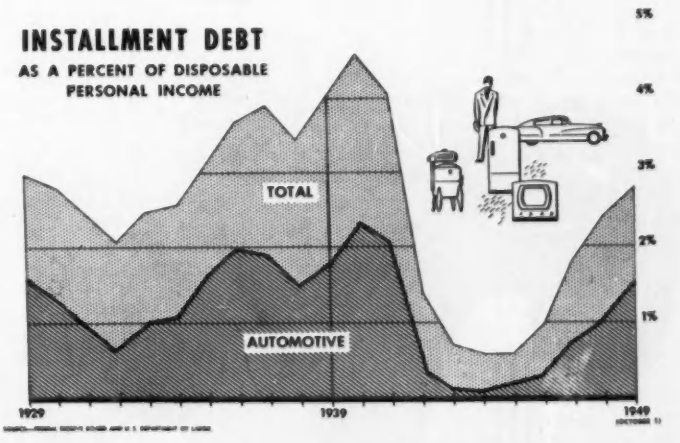
small suppliers. Generally, a fairly stabilized condition is expected to exist this year in labor.

Outstanding automotive installment credit is expected to continue its upward climb in 1950. In 1949 total sales of new and used cars totaled an estimated $20 billion, but automobile credit stood at approximately $3 billion, an unusually low figure when compared with prewar ratios. Automotive installment debt is a much lower percentage of "disposable personal income" than it was in 1941. With heavy production of vehicles scheduled for this year and a stiffened competitive market ahead, a higher percentage of credit sales is looked for, possibly as high as three out of five, the prewar average. Also expected is a weakening of terms on time sales. That had already started to show up in the latter months of 1949 and most certainly will continue at an accelerated pace under the impact of a heavy flow of cars from manufacturers to dealers.

Even though most major plant expansion programs have been completed in the industry, there still are several projects underway or planned that will mean expenditures of millions of dollars in 1950 for tools and equipment. Ford is building a new transmission plant at Cincinnati and a new stamping unit at Buffalo, and equipping a large unit at Monroe, Mich. In addition, there are plans in the works for other major projects calling for large outlays for equipment that may at least get started this year. General Motors is progressing with its new Research Center, which will require a large amount of scientific testing and related equipment. Nash and Kaiser-Frazer will have sizable expenditures for tooling and facilities for their smaller cars, and other companies will have a sizable amount of expansion and modernization requiring tools and equipment.

1949 U. S. Car, Truck and Bus Data

	1949 (estimated)		1948	
Production	**Units**	**Value**	**Units**	**Value**
Cars	5,075,000	$6.85 billion	3,909,270	$4.85 billion
Trucks and buses	1,125,000	$1.55 billion	1,376,155	$1.86 billion
Total	6,200,000	$8.4 billion	5,285,425	$6.71 billion
Replacement Parts	$2 billion		$2.5 billion	
Registrations				
Cars	35.5 million		33,009,515	
Trucks	7.7 million		7,304,824	
Buses	140,000		163,888	
Total	43.3 million		40,478,227	
Special Vehicle Taxes	$3.7 billion		$3.4 billion	
Average Age of Cars	8.4 years		8.8 years	



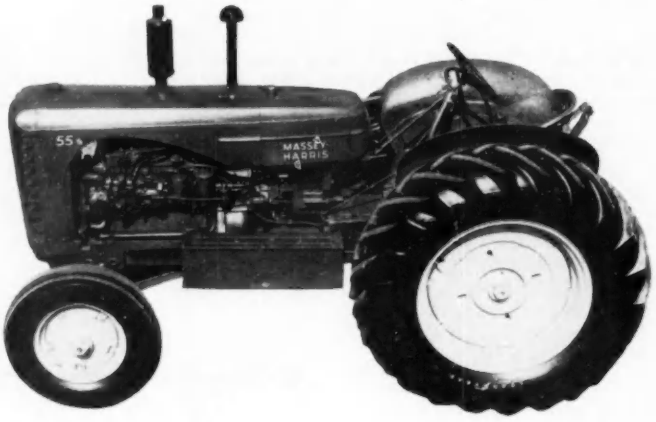
What 1950 Holds for the

By H. E. Everett, Vice Pres. and Editor, *Implement & Tractor*

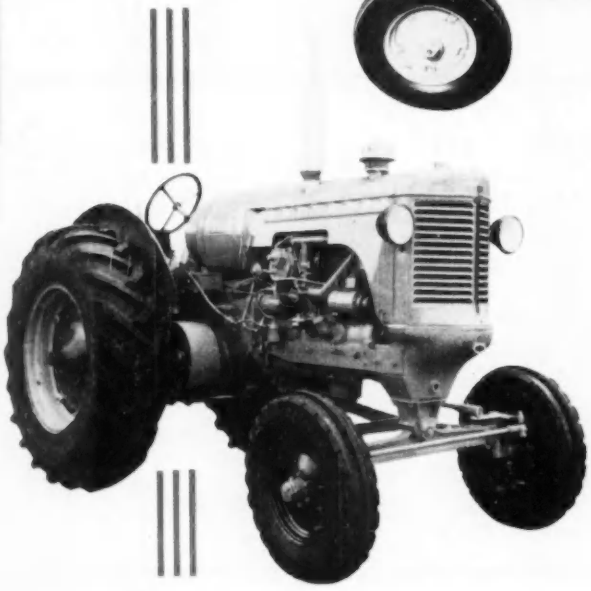
THE tractor and farm equipment industry is starting 1950 in expectancy of an overall market which will produce a volume exceeding $1.25 billion for the fourth consecutive year. The total for 1949 is estimated at approximately $1.5 billion, second only to the 1948 record of $1.69 billion, following $1.29 billion in 1947. While price advances have contributed substantially to the increased volume of the past three years, increases in the industry's physical output have been the most important factor.

The brightest spot in the 1950 outlook is the farm tractor market. The demand for the larger sizes of tractors is still unsatisfied and will require more than can be produced for some time to come. Even the two - plow capacity tractors, normally accounting for more than half of total production, are still moving readily without particular sales effort, notwithstanding that during and after the war production was concentrated on this size in order to provide farmers with the maximum number of tractors. Only the smaller units are slowing down in sales. Garden tractor production declined less than in the previous year.

The industry's sales of tractors for agricultural use in 1949 approximated a half-million units, according to general year-end estimates, which is about 40,000 less than the all-time record of 1948. Sales for 1950 are



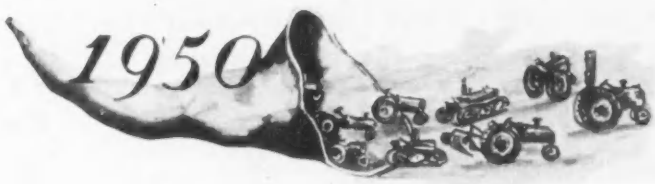
(Above) This Massey-Harris tractor is a new Diesel development.



(Left) Model UTS Minneapolis-Moline tractor. This is the model tested at the University of Nebraska as mentioned in text.

(Opposite page) Late model John Deere Diesel powered tractor.

Tractor Industry



not expected to decline more than 5 to 8 per cent below the 1949 level.

Two soft spots which developed during 1949 and which have been carried into 1950 are the export market and the industrial tractor field. The former accounts for not more than 15 per cent of the industry's annual sales, and the latter about 10 per cent. However, much of the latter is included in the former. The export field for the past two years has been adversely affected by the shortage of American dollars, a condition which has enabled British manufacturers to take over large parts of the Latin-American, South African and Australian markets, formerly dominated by U. S. products. The devaluation of the British pound has made American tractors and equipment 30 per cent more expensive to all importers in countries with currencies related to sterling exchange. As a result several American manufacturers have already reported fourth-quarter foreign trade losses of from 30 to 45 per cent. Present export trade has been confined mainly to products which are obtainable from no other countries.

The slow-down in the demand for the industry's industrial equipment hit quite suddenly in mid-1949. It involves tracklaying tractors, wheel tractors especially designed and equipped for industrial use, and tractor engines fitted for use in such stationary operations as irrigation, as power plants for cotton gins, oil field work, etc., and which are commonly known as power units. Recovery could develop quickly with a pick-up in public works projects, or should a dry growing season increase the demand for pumping engines.

The industry is starting 1950 with many new tractor models, impressive among which is the increased number of Diesel-powered units. The developments were prompted in part by the preference of foreign importers for Diesels, because of the high prices for other than Diesel fuels, and in part because of a growing domestic demand from farms where the number of hours of work per year makes them more economical. A few of the new models marked the completion of a three-year program of redesigning models which were in production at war's end.

The extent of the new model activity was reflected in the fact that 31 tractors were tested during 1949 at the University of Nebraska, by far the greatest number for any one season since the initial year of 1920 with 65 tests. Ten of the tested units were Diesels. The university also during 1949 made its first test with a tractor operating on LP gas, when a Minneapolis - Moline UTS which had previously been tested on gasoline and distillate was tested on propane, and developed more power as well as showing increased fuel economy. Also tested was a Jeep, now being sold as a prime

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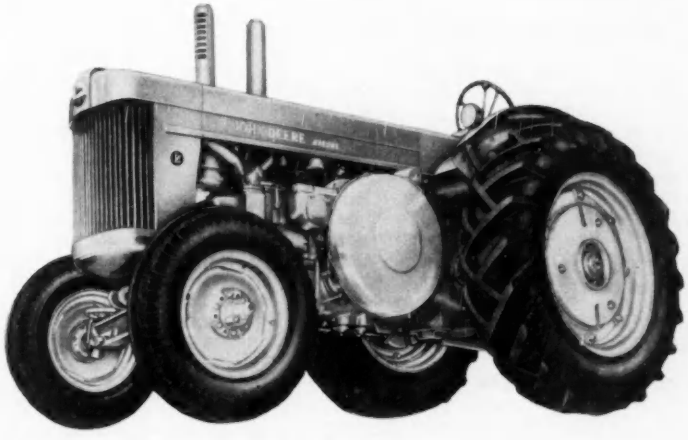

Record Postwar Year for Aircraft

By Robert McLarren

THE aircraft manufacturing industry confidently anticipates a record peacetime year during 1950, but it now is certain that this production will be almost solely for the United States Government, principally the U. S. Air Force. About one-half of the major companies are now 100 per cent military aircraft producers and many of those still doing commercial business show backlogs made up of as high as 92 per cent Government business. Considering also the near-certainty that commercial jet transport production will be sponsored by the Government, it is clear that the aircraft manufacturing industry will shortly be employed wholly by the Government, although retaining its competitive, free-enterprise personality.

It is becoming increasingly apparent that the industry must abandon all hope of its long-desired long-range procurement system with the Government. Although it appeared a year ago that the industry's battle for orderly procurement by the armed forces had been won with the findings of the Congressional Air Policy Board and the President's Air Policy Commission, the projection of procurement over five-year periods now seems wholly remote and the service's procurement policies were never more erratic and unsound.

Therefore, predictions for the productivity of the aircraft industry were never more tenuous. Fortunately, its financial health grows increasingly assured by expansion of its Government participation. The latter, broadly, insures against financial loss on any business and normally guarantees a profit. Therefore, it can safely be said that the historic risk of aircraft shares has been largely removed and 1950 is certain to mark the end of the painful transition of the industry from its postwar abyss ($33 million loss in 1947) to the high-ground of comfortable profits. Thus,

Aircraft Production—1949

	Military	Civil				Total Civil	Total
		Transport		Personal			
	Weight, lb	No.	Weight, lb	No.	Weight, lb	Value	Weight, lb
January	2,000,400	9	144,600	151	136,100	$3,566,883	2,281,100
February	2,577,900	31	591,500	226	186,200	11,475,333	3,355,600
March	3,220,900	23	427,100	376	289,500	11,444,408	3,937,500
April	1,784,500	16	250,900	436	324,800	8,299,444	2,360,200
May	985,000	13	147,000	461	304,700	5,180,503	1,436,700
June	2,460,700	9	255,900	430	282,000	8,395,599	2,998,600
July	2,687,300	(301 aircraft; 478,400 lb)				8,605,772	3,165,700
August	3,410,900	(272 aircraft; 506,000 lb)				9,876,543	3,916,900
September	2,308,100	13	485,000	271	191,000	14,102,227	2,984,100
October	1,697,200	12	486,900	216	160,300	14,510,000	2,344,400
1949 Totals (est.)	26,000,000	150	3,350,000	3,200	2,200,000	$91,000,000	31,550,000

Industry in 1950

Industry Quickly Approaching All-Military Production With Efficiency Increasing and Reconversion Now Complete

profits may vary in succeeding years with the varying tides of procurement, but profits there will be.

A graphic indication of the agitated state of Air Force procurement may be gained by the fact that at this writing the U.S.A.F. has not yet decided its fiscal 1950 program! Procurement programs are usually announced immediately after July 1, the first day of the new fiscal year. Reasons for the delay and vacillation are symptomatic of the single major problem facing the aircraft industry; long - range procurement planning by the Government. First delay was occasioned by the Congress in its fight over the President's 48-Group Air Force program. As a result, the National Defense appropriation was the last major item of legislation passed by the Congress before its adjournment in October. The House-approved 58 - Group program was finally approved by the

Aircraft Engine Production—1949

Month	Military Hp*	No.	Civil Hp*	Value	Total Hp*
January	2,316,100	265	112,400	$1,351,488	2,428,500
February	2,772,900	469	142,300	1,478,652	2,915,200
March	3,604,600	504	123,800	1,163,978	3,728,400
April	3,474,600	603	119,300	1,120,697	3,593,900
May	3,777,200	479	121,300	1,364,579	3,898,500
June	3,519,800	364	95,900	1,110,431	3,615,700
July	4,456,900	286	86,100	1,060,200	4,543,000
August	3,671,500	283	62,300	739,855	3,733,800
September	4,634,200	205	87,100	1,170,247	4,721,300
October	4,992,535	174	78,400	1,051,000	5,070,935
1949 Totals (est.)	45,000,000	4,000	1,200,000	$13,000,000	46,200,000

*1 lb thrust assumed 1 hp.

Aircraft Company Backlogs

Company	Military	Commercial	Total
Beech	$6,200,431	$4,177,036	$10,377,467
Boeing	348,528,203	10,500,000	359,028,203
Convair	237,847,490	2,799,613	240,647,103
Curtiss-Wright	.....	.....	132,800,000
Douglas	196,401,431	3,600,026	200,001,457
Fairchild	70,300,000	none	70,300,000
Grumman	170,000,000	1,500,000	171,500,000
Lockheed	160,734,000	41,534,000	202,268,000
Martin	78,244,773	none	78,244,773
McDonnell	61,896,041	none	61,896,041
North American	238,012,667	none	238,012,667
Northrop	70,156,000	none	70,156,000
Republic	56,500,000	none	56,500,000
United Aircraft	264,000,000	66,000,000	330,000,000
Others	44,300,000	2,500,000	46,800,000
Totals	$2,003,121,036	$132,610,675	$2,135,731,711

Note: Figures are for varying periods and are indicative only of the general level of activity of the industry during the year.

Record Postwar Year for Aircraft Industry in 1950

Senate and this program would have provided funds for 2538 new aircraft in 1950 at a cost of $1.992 billion. President Truman, however, insisted stubbornly on his own 48-group program, which specified the production of only 1,335 Air Force aircraft at a cost of $1.4 billion. He therefore announced his intention of withholding the extra $500 million in order that only his 48-group program could be implemented.

Next stage in the merry-go-round was the decision by Secretary of Defense Louis Johnson to withhold still more funds on his own, and his program slashed 520 airplanes and $300 million out of the 48-group plan, leaving only 815 new airplanes scheduled for procurement by the Air Force. Caught in this contest for economy, the Air Force laid out its own program for 1070 new aircraft worth about $1 billion. This program had no sooner been confirmed than the Air Force Senior Officers' Board announced plans to meet early in January, 1950, to study the entire procurement picture, which means further fluctuations in the program.

Meanwhile the industry went doggedly on its way in the development of new models and improvements in existing ones in the hopes of hitting the jackpot when it does ring. After a year of drastic contract cancellations and program changes in the midst of production, the industry has come to expect anything, and most spokesmen are thoroughly resigned to erratic procurement as the permanent way-of-life of the industry.

Manufacturers of transport aircraft are already facing up to the inevitable revolution from reciprocating to gas turbine power for their products. The year 1950 should witness the announcement of both turboprop and turbojet U. S. transport planes, although there is little doubt that these will come about through Government support. From a definite cold-shoulder to the so-called Prototype Bill, which provided for Government design and development of new transport airplanes, the industry has now come out solidly behind the idea of Government sponsorship of jet transports.

Employment

(entire industry)

	Total	Airframe	Engine	Propeller
1946	196,462	163,259	33,203	N.A.
1947	180,262	147,131	33,131	N.A.
1948	213,168	166,687	38,427	8,054
1949	218,000	168,000	41,000	9,000

N.A.—Not available.

Aircraft Industry Income—1949

(estimated)

Military Aircraft	$1,000,000,000
Civil Aircraft	91,000,000
Military Engines	100,000,000
Civil Engines	13,000,000
Civil Engine Parts	21,500,000
Other Products	60,000,000
Total Income	$1,285,500,000

In this it is supported by the airline industry, which had also felt lukewarm about the idea a year ago.

The outlook for civil aircraft production was never more dismal. Transport builders are resigned to a dwindling of orders during 1950 down to a matter of only 50 or less. The personal aircraft manufacturers, too, never faced more appalling prospects. The individual pleasure owner has virtually disappeared from the scene and personal aircraft production is now heavily four-place business and commercial types. Thus, sporting and student flying has died an astonishingly premature death with no solution in sight to the problem of regaining public enthusiasm.

The helicopter should emerge during 1950 as a passenger transport, reaching its long-predicted place in the transportation field. All major helicopter manufacturers, who produced a total of about 200 during the year, are now readying 10- 15-passenger versions for use as short-line feeder craft serving the major airline terminals. Greatest promise during the year lies in the Metropolitan New York area, where CAB certification of a helicopter mail and passenger service is scheduled. Boston, Chicago and Los Angeles are bidding for authorization for helicopter passenger service and the combination of these markets makes the passenger helicopter a definite promise during the year.

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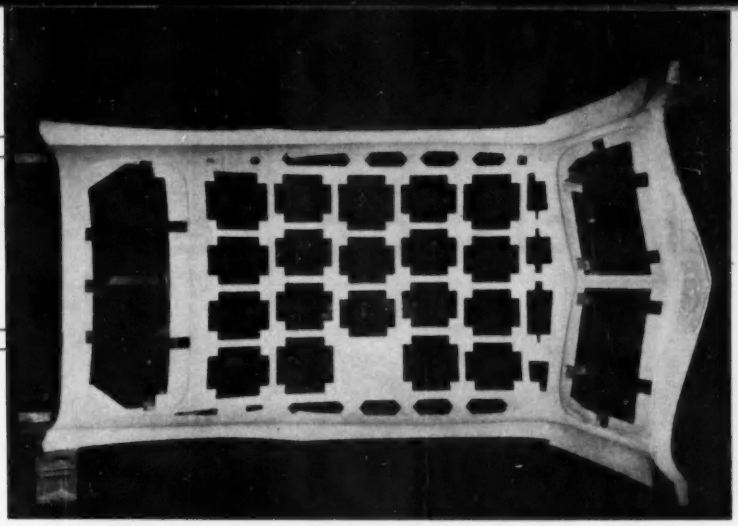


Typical of the large casting resin applications is this master spotting fixture for automobile body roof panels

By Walter M. Stark
American Resin Corp.

Advanced Applications of

Casting Resins

THE purpose of this article is to summarize some of the applications and uses of casting resins as they may be applied in the automotive industries.

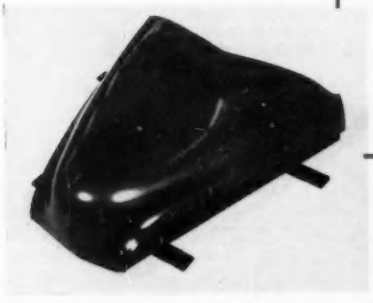
In developments beginning prior to World War II, and accelerated by it, considerable progress has been made in adopting casting resins for manifold uses. Those given below are the most advanced, even though present work such as their uses in the manufacture of torque converter type automatic drives and in the making of plastic die models directly from templates or highly accurate clay models is not completed.

The casting resins are supplied in liquid form and require the use of a catalyst and moderate heat to set up rigid. In order to obtain minimum shrinkage—as low as 0.001 in. per sq ft has been obtained—fillers must be added. Acid washed asbestos which may be modified with up to 50 per cent of specially treated

(*Turn to page* 102, *please*)

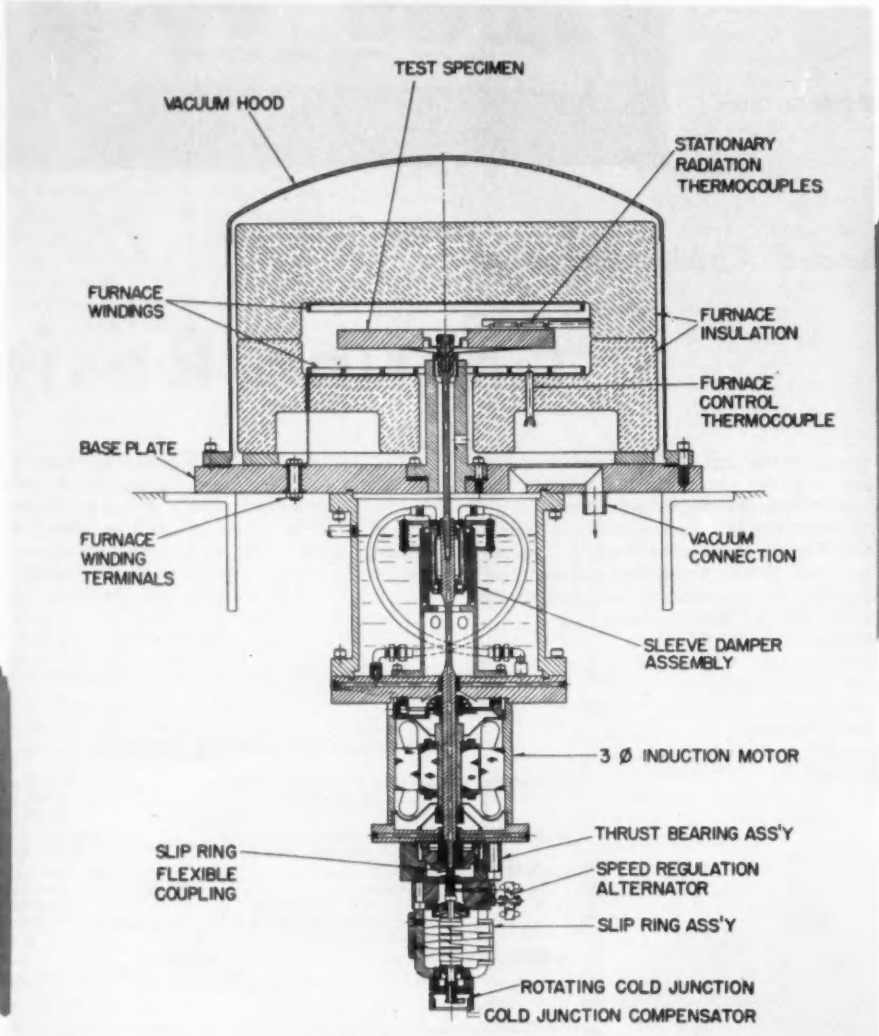
Properties of Casting Resins

STRENGTH:	**Compressive strength (filled)**	**25,000 psi**
	Flexural strength (filled)	**9,800 psi**
	Izod Impact, notched (unfilled)	**.38 ft. lb**
ELECTRICAL:	**Dielectric strength, short time**	**230-270 V/M**
	Dielectric strength, step by step	**130-150 V/M**
CHEMICAL:	**Water absorption**	**less than 0.1%**
	Oil resistance	**excellent**
	Aliphatic solvent resistance	**excellent**
	Aromatic solvent resistance	**excellent**
	Resistance to acetone	**good**
SPECIFIC WEIGHT:		**1.21**
		76 lbs per cu ft-¾ oz per cu in



Another application of casting resin is found in the hood panel duplicate. It can be used as an inspection fixture or for pattern or die reproductions.

Precision Testing *of Gas*



Sectional drawing of high speed disk tester.

Turbine Disks

A PRECISION testing machine has been designed in order to carry out a part of a research project at the Westinghouse Research Laboratories, East Pittsburgh, Pa., to determine the strength of gas-turbine disks. The experimental studies in parallel with theoretical studies have as their objective the development and evaluation of disk design calculation methods. A paper describing the design and operation of machine was written by A. C. Hagg, B. Cametti, and G. O. Sankey of Westinghouse, and was presented to the Society of Experimental Stress Analysis at a recent meeting in New York.

The machine can handle disk specimens up to 14 in. in diameter and two in. thick, and larger specimens can be handled with only minor modifications. The specimen is mounted with the axis vertical on a flexible shaft; an induction motor drive covers a speed range up to 35,000 rpm. The furnace is designed for a specimen temperature up to 1500 F. The specimen temperature may be uniform or arranged for radial gradients up to about 100 F. per in.

Primarily design emphasis was placed on means for accurate measurement and control of specimen speed and temperature, and on the determination of plastic and creep strains. Average speed error for a run is less than 0.01 per cent; the maximum instantaneous error is about 0.5 per cent. Specimen temperature is continuously measured and recorded using specially developed thermocouple circuits and slip-ring coupling; temperature errors are less than 10 F. by test calibrations. Plastic and creep strains are measured over the disk surfaces in radial and tangential directions utilizing punch marked spacings. The average error in strain measurement is five per cent.

To illustrate the type of information obtained in the tests, the data of Figs. 1, 2 and 3 are presented. In Fig. 1 radial strains are shown for a one hour and a five hour run on 19-9-DL material at 1200 F. and 20,000 rpm. Fig. 2 shows radial displacement and Fig. 3 shows tangential strain. The open points plotted in Fig. 3 are calculated tangential strains from the radial displacement curve and the solid points are the measured tangential strains.

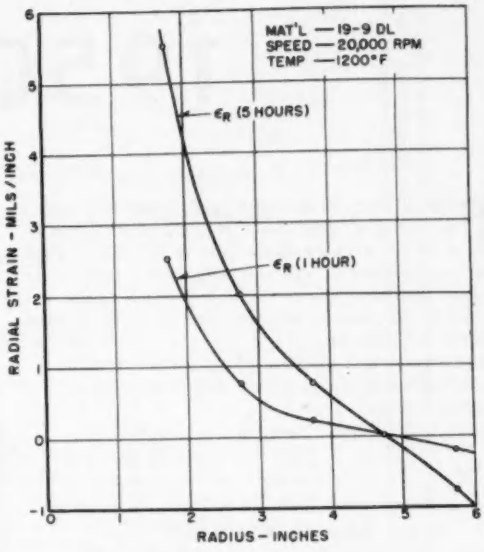


Fig. 1—Radial strain curve.

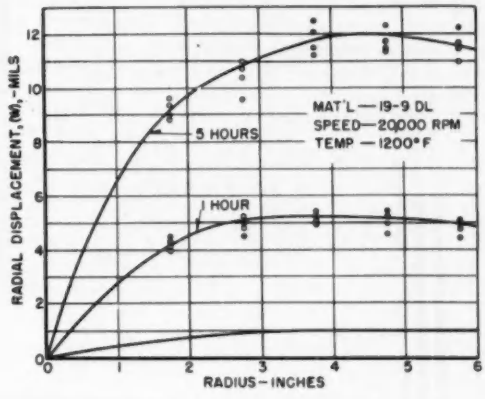


Fig. 2—Radial displacement curve.

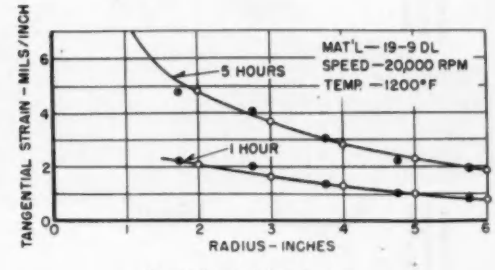


Fig. 3—Tangential strain curve.

1950 Cadillacs

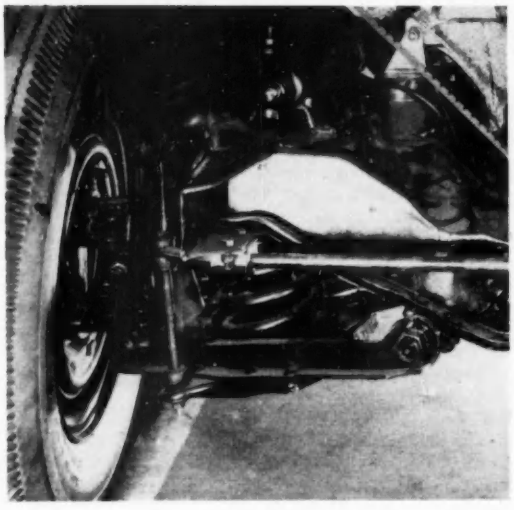
THE big story on the 1950 Cadillac line is found in an array of new bodies throughout the models, a major redesign of the front suspension system and improvement of the rear suspension system, increased braking capacity, some important engine refinements, modulated shifting of the Hydra-Matic, and other detail changes.

Incident to the adoption of an entirely new line of bodies, there has been a change in wheelbases as follows:

Series	1950	1949
61	122 in.	126 in.
62	126 in.	126 in.
60S	130 in.	133 in.
75	146¾ in.	136¼ in
86 (comm. chassis)	157 in.	163 in.

The entire setup of body models, overall length, overall height dimensions, and curb weight are shown in the accompanying table. It is of interest that although the wheelbase of both Series 61 and 60S has been decreased, body length and roominess in general have actually been increased somewhat by changes in body structure and by moving the body forward on the chassis. This was made possible by forward shifting of the engine by five in.

Perhaps the major mechanical change is found in the redesigned front suspension system. This was brought about through the adoption of direct acting shock absorbers, mounted within the coil springs to simplify the mechanical arrangement. One-in. diameter shock absorbers are installed on the 61, 62, and 60S, while the 75 has 1⅜-in. units. At the same time front coil spring diameter has been increased to reduce stresses, thus increasing life and reducing settling. The front stabilizer has been



View of new front suspension system with direct acting shock absorbers mounted within the coil springs. Also note new front stabilizer and stamped front mounting elements.

Five passenger coupe of Series 61

Feature New Bodies

Mechanical Changes Include Redesigned Front Suspension, Improved Hydra-Matic Transmission, and Refinements in Engine Details

By Joseph Geschelin

altered to improve handling for the driver.

With a complete change in the front suspension system, caster and camber adjustments have been simplified and provision has been made for more adjustment than before.

The mounting of direct acting shock absorbers at the rear in "sea-leg" fashion serves the dual function of minimizing transverse shake and controlling the ride, thus making the previously used track bar unnecessary. At the same time the new frames have the intermediate cross member moved forward of the differential where it takes the rear shock reaction. This member also strengthens the frame transversely at the kick-up.

Improvement has been effected in the brake system on Series 61, 62, and 60S by increasing braking area while reducing rubbing velocity. This has been accomplished by increasing lining width and reducing brake diameter. Brake cooling is improved thereby and lining life is said to be increased. Although braking ratio front to rear remains the same, the brakes are said to be more effective because of the change in weight distribution.

While the high compression V-8 engine remains basically unchanged, Cadillac has effected a number of important changes in details and in accessories. The most significant improvement is in the introduction of a carburetor idle heating system, said to be a "first" in the industry. It will be recalled that during the warm-up period, the thermostatically controlled heat valve in the exhaust manifold system diverts the heated exhaust gases into the heat passage under the intake manifold. For 1950 this heated mixture is also led upward through the carburetor to the area around the idle ports. This is said to prevent ice formation at the

(*Turn to page* 92, *please*)

Five passenger sedan of Series 62

Torque Converter Stamped

STUDEBAKER'S automatic transmission, offered as optional equipment for 1950 and to be produced by the Detroit Gear Division of Borg-Warner Corp., will employ a torque converter and flywheel "package" to be made by the Long Manufacturing Division of Borg-Warner. Design, construction, and operation of this new, fully-automatic transmission were described and illustrated in the Dec. 15, 1949, issue of AUTOMOTIVE INDUSTRIES.

Recognized for many years as a leading producer of automotive radiators, clutches, and related devices, the Long Division has also kept abreast of the particular demands of the manufacturers and users of automatic transmissions. Present production includes several sizes and designs of clutch plates used with automatic transmissions. The cork or semi-metallic linings are bonded to the disk, some are grooved and slotted, some include spring cushion centers.

Prior to the war, a limited number of hydraulic couplings of the fabricated type were produced, afterward the development program on this device was continued. Recognizing the trend of the industry toward transmissions including torque converters, this division, several years ago, entered into an intensive program of design and testing on torque converters. Experience with couplings of the fabricated type had developed a unique method for assembling and locking the vanes in place. Applying this knowledge plus additional ideas to torque converter construction has resulted in a fabricated design which is simple to produce and has performance characteristics well suited to the transmission in question.

Fig. 1 shows the complete package while Fig. 2 shows the various units in their relative positions prior to assembly. Two bearings on either side of the one-way clutch in the stator assembly are the only castings. Four forgings, a number of cold upset studs, bolts and rivets, and a piece of tubing for the impeller hub are the only parts not fabricated from stampings. While the illustrations show the flywheel and impeller assemblies bolted together, production will see them joined together by an arc weld around the outer diameter.

The front side of the flywheel has projection welded to it a central pilot which fits into a hole in the crankshaft, and eight mounting studs which, by means of self-locking nuts, attach to a flexible drive plate fastened to the crankshaft. Inside the wheel is a stamped member which acts as a cylinder for the direct drive clutch and as a mounting means for bolts which attach the back plate. The stamped member is riveted to the flywheel and an "O" ring between them prevents leakage of the higher pressure in the cylinder into the lower pressure converter chamber.

To maintain balance and prevent friction, the piston is attached to the cylinder by three straps. A rather unusual stamping, projection welded to the front side of the piston, forms the retainer for the rubber lip seal fitting in the cylinder bore and for a small "O" ring through which the end of the direct drive shaft projects.

Fig. 1—Complete torque converter and flywheel assembly. This illustration shows the units bolted together, which will be superseded by a welded joint when the converter is in production.

produced with

Steel Parts

By R. C. Zeidler
Chief Engineer, Clutch Division
Long Manufacturing Division of
Borg-Warner Corp.

When the transmission is in direct, all of the drive is transmitted through the clutch plate which has a spring cushion center. Its slotted and grooved cork facings are bonded to the heat treated, spring steel disk. Drag or hang-up is eliminated by a slightly-coned rim section of the disk which flattens out when the clutch is engaged but resumes its original shape when the piston retracts to release the clutch.

A driving surface for the clutch is provided by the back plate which is spaced from the cylinder flange by bushings and has attached to it an inner stamping having a bronze washer which takes the thrust of the turbine hub when coasting. Shims under the thrust washer permit a final adjustment for stackup prior to assembly.

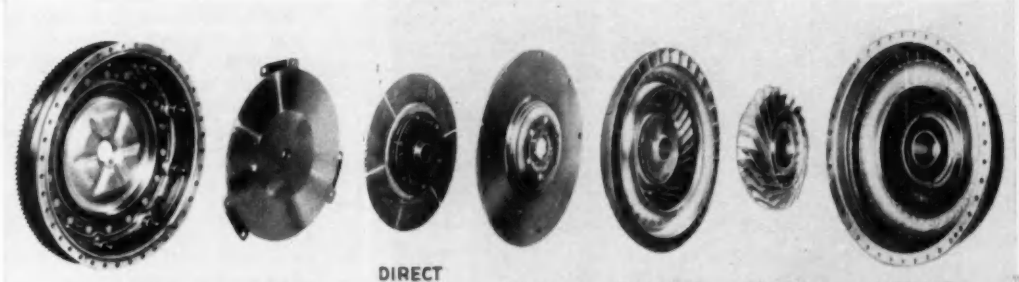
In assembling the various parts making up the three vaned elements of the converter, a minimum of brazing and welding is used. The vanes for the turbine and impeller are made of half-hard, cold-rolled steel while the core rings, turbine shell and impeller housing, although made from deep drawing steel, have their physical properties increased considerably through cold working induced by the drawing operations. Since no furnace brazing is done on these parts, maximum physical strength is retained in the finished assemblies.

Stator design readily permits copper brazing in an atmosphere-controlled furnace. The vanes are made from soft steel and each has two tabs which project through slots pierced in the stator ring. The tab near the leading or front edge has a slight hook and is inserted first while the other tab near the trailing edge is positioned relative to the slots in the ring so slight interference occurs, necessitating some pressure to snap it into place. This is done in a fixture which then holds the vanes while a single large punch shears and bends a portion of each of the rear tabs protruding through the ring, thus locking each vane in place. The rough-machined outer race of the one-way clutch is next pressed in place against small tabs which provide positioning after which the assembly is ready for brazing.

No ring is used around the outside of the stator vanes as the flow at this point is guided by the close relationship of the inner diameters of the turbine and impeller core rings. The curvature of the vane and the long sweep of its trailing edge provide a wide base to best resist the combination of cantilever bending and

(*Turn to page* 114, *please*)

Fig. 2—Units of the assembly in their relative positions. Welded construction is to be used in production as mentioned in Fig. 1.



More Tractor Gears

By Herman Schaefer,
Master Mechanic,
Charles City, Iowa, Plant, The Oliver Corp.

EVEN before the end of the last war it became evident that peacetime would bring with it a need for the production of agricultural equipment in quantities never before attained. It was further recognized that vastly higher labor and materials costs would have to be offset as far as possible by more modern methods of manufacture in order that prices to the user would not rise too high. Cheapening our product to accomplish this was out of the question. If anything, product quality would have to be even higher to meet the increasingly tougher service demands.

In an effort to fulfill these requirements, the Oliver Corp. undertook an extensive manufacturing research and development program in cooperation with leading suppliers of industrial equipment. The effectiveness of this program is best demonstrated by the fact that in 1949 Oliver turned out 22,000 tractors of four different types compared with 15,000 tractors in our best prewar year. This output, furthermore, was obtained with approximately the same floor space for gear production.

Perhaps the best example of the manner in which this has been accomplished is in the making of gears. While Oliver produces some four tractor types, the major part of our production is represented by three types—our K, L and M models. Each of these has its own individual basic transmission plus a number of variations such as power take-offs, etc., as required for different types of operations in the field.

First step in our program was the adoption of gear-shaving which presents an excellent means of reducing overall gear production costs. We also get better gears by shaving them—more accurate involute form, increased contact through more accurate spacing, longer life, etc.—and, at the same time, we have reduced total gear cutting and finishing time and lowered our tool costs. These savings break down roughly as follows:

1. Total machine time for hobbing plus shaving is only about 85 per cent of the machine time for hobbing alone. The reduction in pre-shave cutting time is due to:

(a) Ability to increase hobbing feed when shaving is used.

(b) Ability to use climb-cutting when followed by shaving.

(c) Ability to use double-lead pre-shave hobs for small gears and triple-lead hobs on larger gears.

(d) Eliminating rough hobbing as a separate operation.

(e) Use of underpass shaving wherever possible.

2. Reduction in tool costs. These are due to:

(a) Long hob life by shifting on $\frac{1}{8}$ in. instead of $\frac{1}{2}$ in. of the circular pitch.

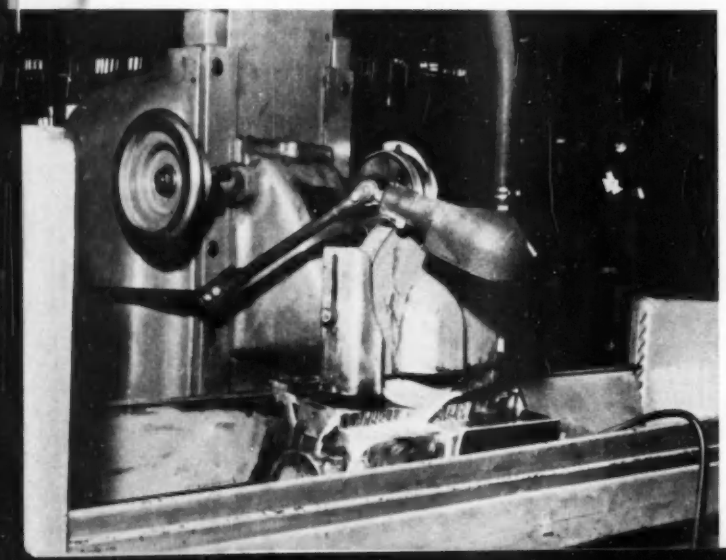
(b) Elimination of rough hobbing and the necessary tools for this operation.

(c) Reducing the chip load by using larger hobs.

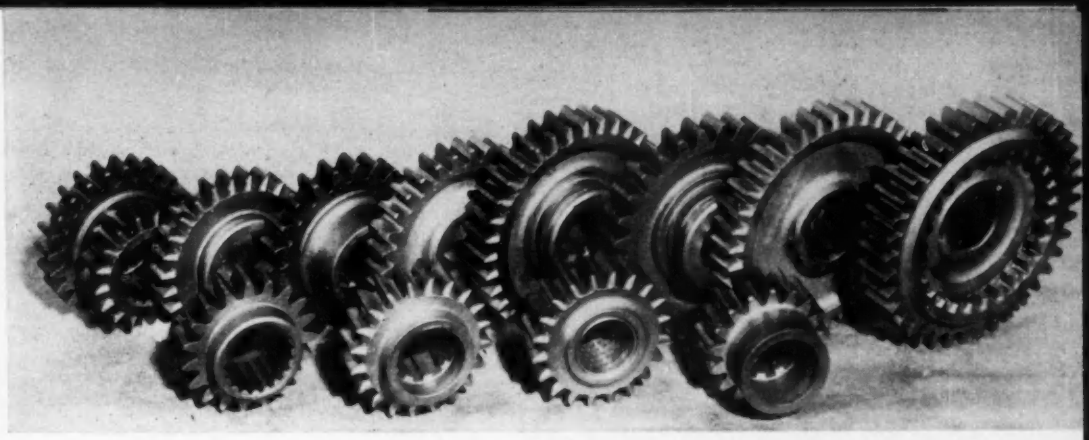
(d) Low tool cost for shaving cutters, since 15,000 to 20,000 gears may be shaved before sharpening is required. Each cutter may be sharpened three times before re-serrating.

(e) Ability to use each type of shaving cutter for four or five different gears.

Underpass shaving is used



Sharpening a set of Shear-Speed blades on a surface grinder.



All these gears in just one transmission are run on the Shear-Speed.

at Lower Costs

wherever possible since it gives us the quality of gears desired with the minimum cutting time. In addition gears can be crowned or curve-shaved during the underpass shaving operation by using crowned cutters—eliminating a separate operation.

A total of 44 types of production gears are run on our Michigan 870 shaving machines. These range from 2.232 to 8.5 in. diameter with pitches of 6, 7 and 8. The smallest number of teeth on any gear is 15 while the largest number is 57.

Of these 44, some 31 gears are shaved underpass and 13 gears — having particularly wide faces — are shaved transverse. Some gears are still being shaved by the "traverpass" or diagonal method— mainly to use up old cutters not adaptable to underpass shaving.

In general, shaving cutters are standard for gears having more than 25 teeth and are special for gears with a fewer number of teeth. Gears which are crowned by the use of crowned cutters include: Pulley drive stationary gears, reverse idlers, bevel pinion shaft idlers, and various countershaft gears including those for multi-reverse speed.

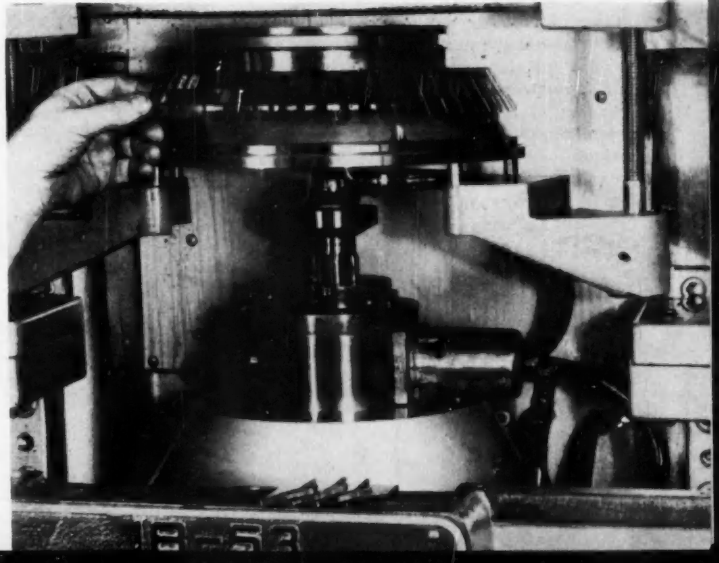
Production runs before changing to another gear are usually between 2000 and 3000 gears—well within the gears-per-sharpening for the shaving cutter.

Gear Cutting

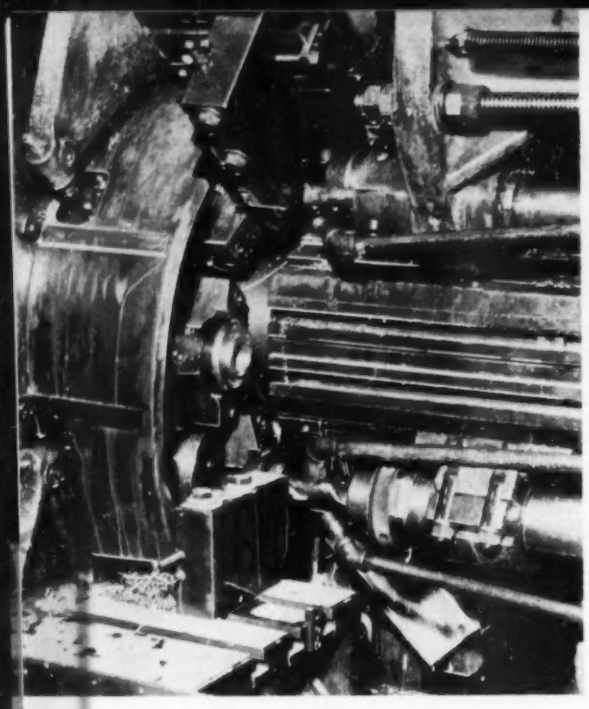
Having assured ourselves of obtaining better gears at lower cost we next went to work on reducing our pre-shave cutting costs. To achieve the increased production desired we installed a Shear-Speed gear cutting machine. Saving of floor space by the use of a single machine was only one of the gains achieved. Some of the others were:

1. Pre-shave cutting time was reduced to an average of only a little over one minute per gear.
2. Savings in tool sharpening time.
3. Actual working time of an operator on a Shear-Speed is only about one hour out of eight. Therefore he can easily handle two or three such machines without difficulty.

It is our practice to change Shear-Speed blades



To change blades when necessary, the head of the Shear-Speed is lowered, the old blades are slipped out and a new set is slipped into place as shown.



Closeup of National Acme machine used to cut blanks.

every 300 gears with a sharp set ready for insertion at all times. Four sets of blades of each type are provided and at the end of a run of 1200 gears, the machine setup is changed to another gear type. The total life of a set of Shear-Speed blades (about 18,000 gears) is approximately equal to 50 days' gear output.

Third factor in tool costs is the matter of setup and changeover time. This theoretically presented quite a problem to a company such as Oliver. In effect we have to operate pretty much on a 'job-run' basis. Our Shear-Speed is required to produce about 70 per cent of the gears in three transmissions which means frequent changes with resultant non-productive down-time of the machine. Obviously down-time per changeover had to be held down to the minimum.

The solution was provided by Michigan Tool Co., producers of the Shear-Speed. In effect it consists of operating the Shear-Speed on a constant stroke for all gear types, regardless of face widths. While this means a slight sacrifice in maximum output, the time lost is more than made up in reduced changeover time. Actually the time required to change Shear-Speed blades is 30 minutes. As to the operator's working time, it takes only eight seconds to unload and load the machine out of a total machine time, floor to floor of say 75 seconds. Thus for 67 out of each 75 seconds, the operator is idle.

Blanking

Our next step was to bring time required to blank a gear down to the same level obtained for gear cutting and gear finishing. We decided on National Acme automatic blank turning machines of the six spindle type. They are capable of turning out enough blanks to feed the Shear-Speed and the 870 Underpass gear finishers. Thus our three key operations—blanking, cutting, finishing—are all on the same productive time cycle and can be considered as a unit in figuring productive rates and capacity.

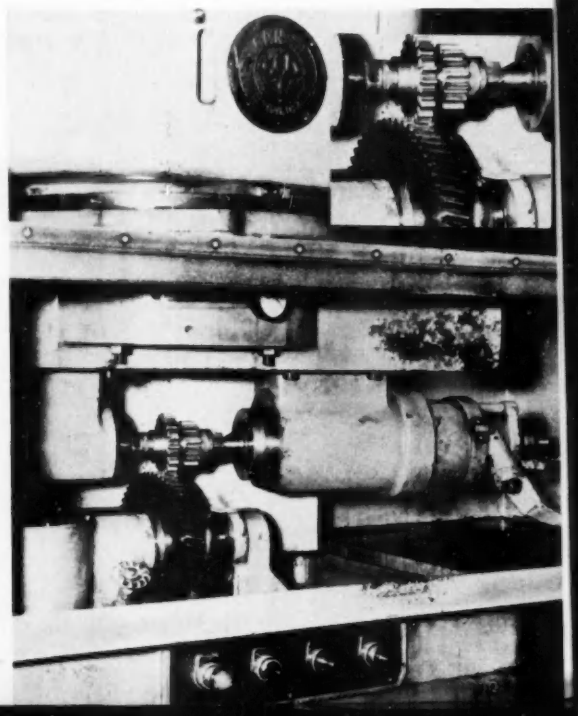
Materials Handling

Being able to sequence our key machines on a strictly time-for-time basis has simplified our materials handling problem and we can now concentrate our production instead of having it scattered all over the shop.

Scheduling

Our practice in the past was to run say three months on gears for one tractor. We then switched to a second

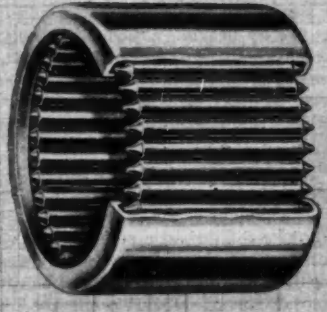
(*Turn to page* 112, *please*)



Closeup of underpass gear-shaving on a Michigan 870 using crowned cutter to "curve-shave" a pinion.

TORRINGTON NEEDLE BEARINGS

contribute to compact design



For high load capacity in restricted space, Torrington Needle Bearings are unequalled by any other type of anti-friction Bearing.

Assemblies incorporating Needle Bearings are models of engineered compactness, simplicity and efficiency. This engineering advantage of Torrington Needle Bearings has contributed to important design advances in many products. When your problem is to secure compact, lightweight design with high unit capacity, the Torrington Needle Bearing is specially engineered to meet your requirements.

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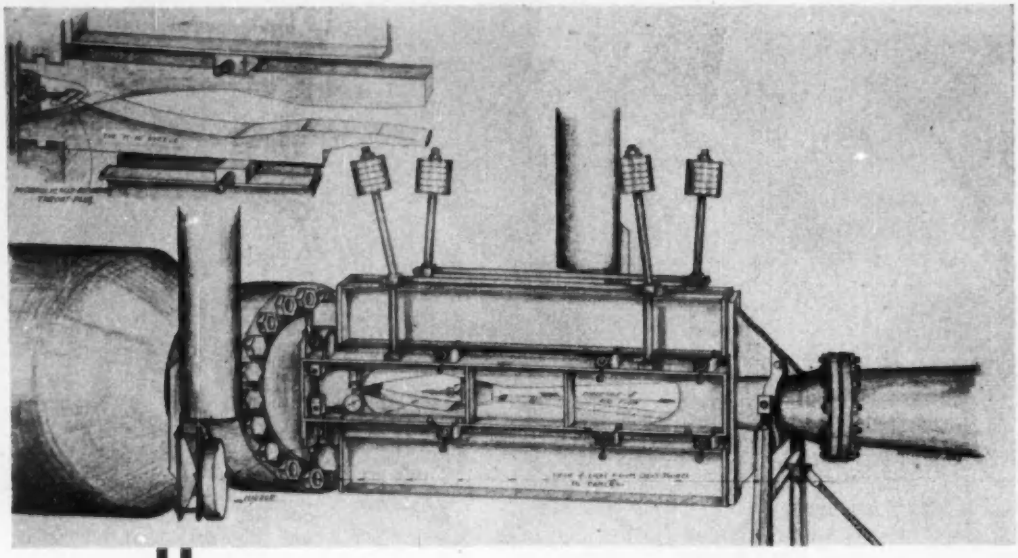


Sketch showing general arrangement of the hypersonic wind tunnel. Inset at upper left shows details of the nozzle and hydraulically-actuated throat plug which closes the slit until sufficient air pressure has been built up in a six-ton pressure tank.

Hypersonic Wind Tunnel For Continuous Operation

A SPEED of more than ten times the velocity of sound has been attained for the first time in a new hypersonic wind tunnel designed and built for the Army Ordnance Department at the California Institute of Technology. Previous highest known speed of air flow in supersonic wind tunnels was about seven times the speed of sound which could be maintained for a period of only a few seconds. The new Ordnance-Caltech tunnel operates continuously, and air velocities of Mach 10 can be maintained for any length of time desired.

The tunnel will be operated under Ordnance Department contract and will be used to obtain basic information about the design, performance, and instrumentation of tunnels for hypersonic speeds. Basic experimental data on shockwaves, boundary layers, and the flow past models at hypersonic speeds will also be obtained. Information regarding these problems is needed to design and build future rockets and missiles.

The test section, in which models of missiles are mounted, is five by five in., although the entire test section stretches to an over-all length of four ft. This includes a region of acceleration downstream from the nozzle throat followed by the test section and a diffuser section where the process of slowing down the air takes place.

To accelerate in the expansion section, air must pass through a slot in the throat of a specially designed steel alloy nozzle. The height of the slot depends on the desired Mach number. Thus, at a speed of Mach 10, air at high pressure blasts through a 0.006-in. slit. When the air suddenly expands into the test section, the temperature drops to about −430 F, while the pressure drops to about one millimeter of mercury.

A schlieren optical system is used to photograph the fast moving air as it speeds past the models in the test section. An arrangement of mirrors is used to pass parallel light through the glass windows of the test section. Shock waves in the air stream act as minia-

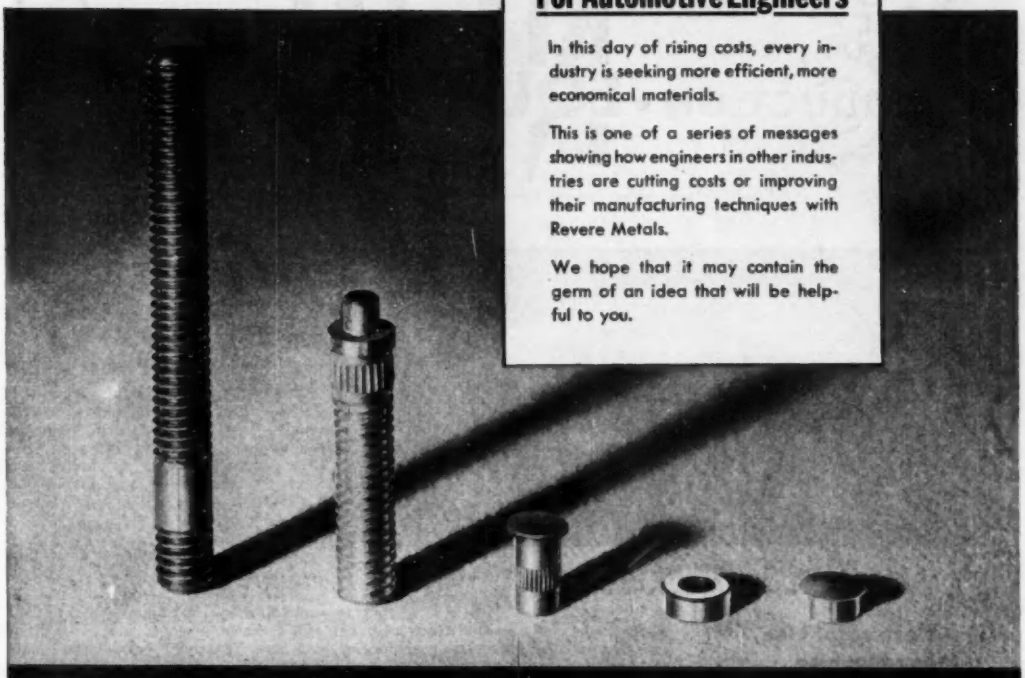
(*Turn to page* 112, *please*)

For Automotive Engineers

In this day of rising costs, every industry is seeking more efficient, more economical materials.

This is one of a series of messages showing how engineers in other industries are cutting costs or improving their manufacturing techniques with Revere Metals.

We hope that it may contain the germ of an idea that will be helpful to you.



IF YOU MACHINE COPPER—

THIS REVERE METAL WILL SAVE YOU MONEY

REVERE makes Free-Cutting Copper Rod, and if you are making electronic devices requiring machined copper parts of high conductivity, it will pay you to investigate the savings made possible by this metal. We would suggest that you make trial runs to prove what it will do under your own shop conditions. That was the procedure followed by The Trumbull Electric Mfg. Co., Plainville, Conn., with these results:

Part #18107 and 18108, contacts for the Type D switch illustrated, were designed around this alloy. Trumbull states: "On both these parts we found we could make them in one operation instead of two. That is, due to the smooth free cutting of the metal, it was unnecessary to perform a facing operation . . . Our Screw machine foreman advises that, in his opinion, both these parts could be made four times as fast as out of ordinary electrolytic copper rod."

#3731, 60 amp. post stud.—5,760 pieces run in 19.6 hours with no machine down-time; 10,425 pieces of ordinary copper rod run in 66.6 hours with 11.8 hours machine down-time. In addition to the extra time required, three sets of dies were used for the regular rod. "The savings of the free-cutting material over ordinary copper were figured at $1.81 per thousand, including in these costs both material and direct labor."

#16552, space washer. "Savings per thousand over electrolytic copper were 77¢. This figure included the material difference and direct labor. In addition, there was an 18% saving in machine down-time."

#K-60-1A, 70-200 amp. stud. "The use of Free-Cutting Copper Rod on this part very definitely increased production and practically voided machine down-time.

In a letter to Revere, Trumbull added: "In general, at least for most of the parts we have used, we find that there is at least a 25% saving in machine time of free-cutting over regular copper. In addition, the workers are enthusiastic about this material, particularly when running studs, because of the fact that it is no longer necessary for them to keep a constant close watch on the machine to see that the turnings do not become tangled up with the moving parts of the machine."

The Trumbull experience is being duplicated in other machine shops. If you have not tried this Revere Metal, we suggest you get in touch with your nearest Revere Sales Office.

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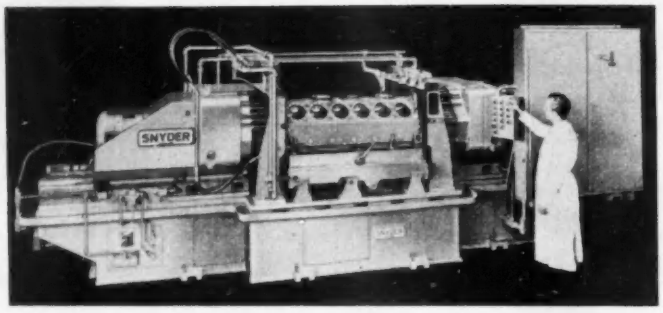


Snyder two-way horizontal line index machine for drilling, reaming and tapping holes in a large aluminum alloy crankcase

J-11—Horizontal Line Index Machine

A two-way horizontal line index machine has been designed and built by Snyder Tool & Engineering Co., Detroit, Mich., to permit greater accuracy in drilling, reaming and tapping holes in a large aluminum alloy crankcase.

The machine is equipped with two Snyder standard hydraulic slide units which carry the multiple spindle heads for drilling and other operations. These units move on hardened and ground steel ways. Two Snyder standard lead screw tapping units are mounted at the rear of the machine. The tapping unit for the flywheel end of the part has 25 lead screw spindles. One of the tapping spindles in this head is used in a separate platen to tap the oil galley hole. An 11 lead screw spindle head is required for the opposite end. High speed steel tools are used and the operation of drilling, reaming and tapping a total of 53 holes in the flywheel end and accessory end of the workpiece takes three minutes, plus loading and unloading time.

The work holding fixture is mounted on a hydraulically actuated slide which moves the part through four work stations and back to load and unload station. The slide is accurately positioned at each work station by an hydraulically actuated shot pin, except at the fourth where the fixture is held against positive stops.

Power is supplied by two 15 hp motors at 1800 rpm; one 7½ hp motor at 1200 rpm; one 5 hp motor at 1200 rpm, and 2 hp. motors at 1200 rpm. Work cycle is automatic after loading and manual clamping. The machine is electrically interlocked for safety and can be operated by unskilled help. Electric limit switches are completely protected from coolant.

The base is welded steel, thoroughly ribbed and normalized. Coolant is in a separate tank mounted at the rear of the machine. Required floor space is 227 in. by 125 in.

J-12—Enclosed One Point Presses

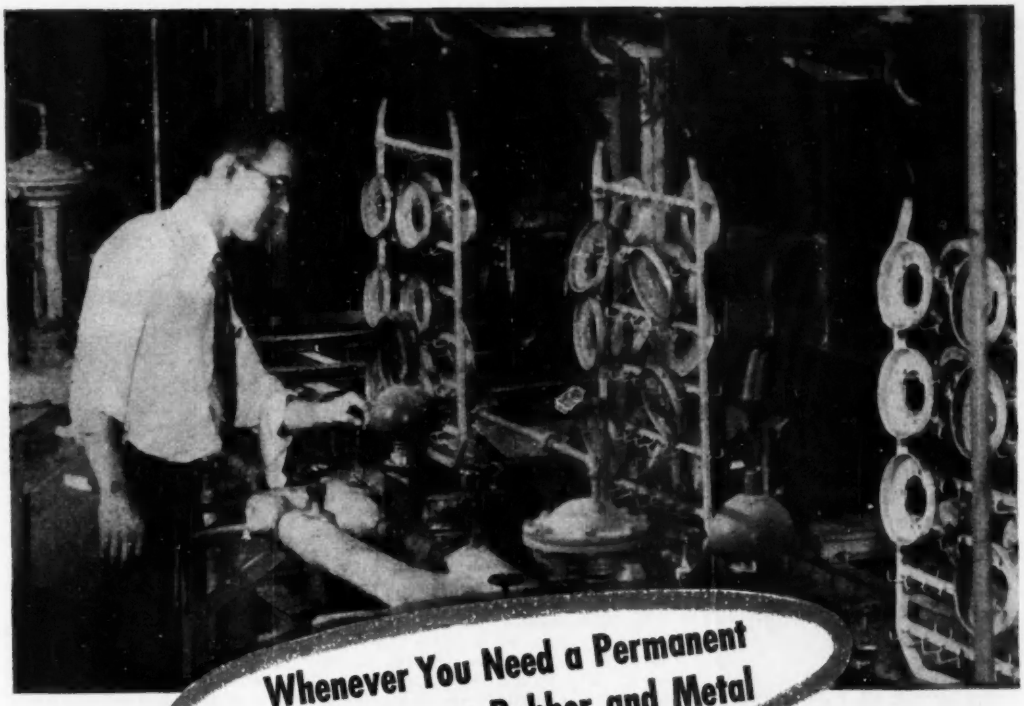
New enclosed one point presses of 500 tons capacity and larger, which require less headroom and feature a box type crown, long, fully enclosed slide, barrel type slide adjustment and Meehanite castings throughout, are being built for a large automobile manufacturer by the E. W. Bliss Co., Toledo, Ohio.

Less headroom is required for the new presses, since the main drive unit is lower and the clutch and flywheel assemblies are outside the crown.

The crown, a long, deep, box type structure, extends below the main gears, giving a rigid connection between the front and rear members. Front and rear crown panels are individual box sections.

(*Turn to page* 67, *please*)

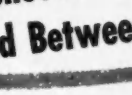
Bliss enclosed one point press



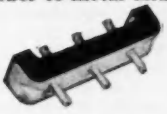
Whenever You Need a Permanent Bond Between Rubber and Metal

"BRASS-O-MATIC" is the answer

The "Brass-o-matic" process is just one of the scientific operations U. S. Rubber uses to help you make today's cars and trucks ride more smoothly and silently. This unique system of brass-plated adhesion results in a permanent bond between the metal and the rubber . . . and only U. S. Rubber offers "Brass-o-matic."



This technique of bonding rubber to metal was developed by U. S. Rubber Engineers, working closely with Automotive Engineers. Today, the U.S. technical team can help you on a wide variety of problems involving noise, vibration and wear—by means of rubber-to-metal and all rubber parts. This team consists of chemists, physicists, metallurgists and design engineers.



Just call or write, United States Rubber Company, Engineered Rubber Products Division—Fort Wayne, Indiana or 5850 Cass Avenue, Detroit.

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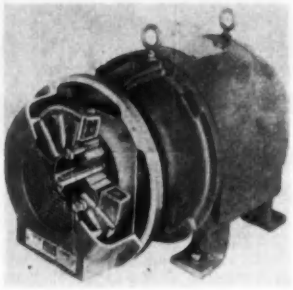
UNITED STATES RUBBER COMPANY

NEW PRODUCTS

For additional information regarding any of these items, please use coupon on page 56

K-12—Disk-Type Electric Brake

The Warner Electric Brake Co., Beloit, Wis., introduces a new, disk-type electric brake for electric motor applications to give easily controlled, fast, smooth cushioned stops. These new additions to the Warner "ICB" industrial brake line mount to a standard NEMA "C" flange. The brake is a combination magnetic and friction type, electrically operated, requiring only 25-35 watts of direct current for full application.



Warner disk-type electric brake

Operating instantly, action starts when the current is applied. The secret of its new super-stopping power is said to lie in the fact that the brake utilizes not only ordinary friction, but also the power of electro-magnetic attraction between its ring-shaped electro-magnet and armature disk.

Applied power varies with the flow of current through the magnet. Brake action may be controlled to a fine degree manually or automatically.

Rectified power can be obtained from 110, 220 or 440 volt AC by using a simple low-cost conversion unit. Standard production sizes are available for mounting on NEMA standard motor frame sizes 203 through 365 inclusive.

Design of the unit permits exceptionally high heat dissipation rate. The steel plate back of the armature disk acts as a blower, this blower action dissipating the heat where and when it is generated.

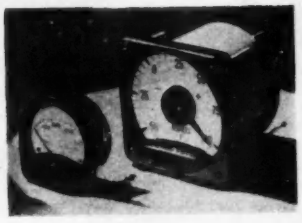
The brake offers constant self-adjustment, since the armature disk rides in constant light contact with the friction surface of the electro-magnet. Where application requires, light spring pressure maintains this constant contact and follows up all wear between the two surfaces, eliminating need for any mechanical attention.

K-13—Temperature Indicators

A new line of temperature indicators for industrial and laboratory use placed on the market by General Electric Co., Schenectady, N. Y., include cold-end compensated thermocouple thermometers for measuring temperatures up to 3000 F and resistance thermometers for temperatures up to 300 F.

The thermocouple thermometer is available in two sizes: the Type DO-71 with a 3½-in. flange and the DW-71 with a 2½-in. flange. Both types can be supplied in either square or round molded Textolite cases.

The thermocouple thermometer can be used for temperature measurement in a wide variety of industrial applications, including galvanizing vats, melting pots, industrial furnaces, infrared drying ovens, oil quenching baths, ceramic kilns, and salt baths for annealing.



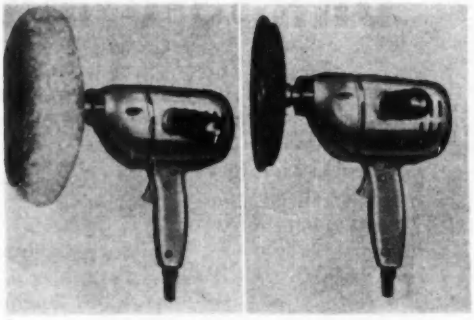
G. E. square thermocouple thermometer Type DO-71, and resistance thermometer Type DB-15

Designed for the measurement of low temperatures where high accuracy is important, the resistance thermometers are available in two standard types: the DB-15 long-scale instruments and the Types DD-6 and DD-7 six-in. rectangular, surface- and flush-mounted instruments.

These thermometers are suitable for

(*Turn to page 64, please*)

K-14—Polisher and Sander



Light, balanced 7-inch junior polisher introduced by the Van Dorn Electric Tool Co., Towson, Md., weighs 8 lbs and is a side handle type unit with a reversible auxiliary side handle for either right hand or left hand use. It is equipped with a spindle locking pin for speedy changing of bonnets and pads. Side handle has a trigger switch with switch locking pin for continuous operation. No-load speed is 2000 rpm. Housings are aluminum castings.

Portable electric tool, the 7-in. junior sander, offered by the Black & Decker Mfg. Co., Towson, Md., is a side handle model with a reversible auxiliary side handle for either right or left handed use. Weighing 8 lbs, housings are aluminum castings. No-load spindle speed is 3500 rpm. The tool is equipped with a spindle locking pin for speedy changing of sanding disks and other attachments. Unit is powered with Black & Decker universal motor for AC or DC.

Looking both ways

Janus was the god of beginnings. He could look both ways. January is a good time for looking back, and ahead. Looking back, we thank you again for the co-operation your engineers and production men have given us since 1931. Looking ahead, we urge you to make full use of our men, machines, and laboratories—the finest in the field—to help make your good engines even better.

SEALED POWER CORPORATION
MUSKEGON, MICHIGAN

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Publications AVAILABLE

New Industrial Literature listed in this department is obtainable by subscribers through the Editorial Department of AUTOMOTIVE INDUSTRIES. In making requests please be sure to give the NUMBER of the item concerning the publication desired, your name and address, company connection and title.

H-13 Testing Grease Performance

The Texas Company—Lubrication, a company publication, devoted to the selection and use of lubricants, features in its December, 1949, issue, an article entitled "A Method for Testing High Temperature Performance of Greases."

H-14 Batteries

Thomas A. Edison, Inc., Automotive Div.—A new, 24-page catalog in color, features the complete line of Edison batteries for automobiles, buses, trucks, tractors and marine and Diesel service. The catalog presents a complete description of Edison parts and outstanding features, outlines quality controlled manufacturing methods and gives complete merchandising information.

H-15 Timing Chains

Chain Belt Co.—Bulletin No. 49-5 describes the construction and use of Duckworth Automotive Timing Chains. The first part of the bulletin describes automotive timing problems and their solutions. The exclusive design features of the Timing Chains are described.

H-16 Control Centers

Westinghouse Electric Corp. — New standardized control centers are described in detail in booklet B-4213. The booklet discusses the safety features of these control centers and design features. Sections on how to plan a control center, a table containing the dimensions and weights of starter and other interchangeable units and reference tables for selection of starter sizes are included.

H-17 Materials Handling Machines

Clark Equipment Co., Industrial Truck Div. — A new general catalog covering the full Clark line of forklift trucks and towing tractors, is available. Drawings of the various units and specifications are included. Data has been arranged so as to make comparisons between various models as simple as possible.

H-18 Precision Cylindrical Grinders

Landis Tool Co.—A new catalog contains illustrations of the new 12 inch type CH Universal Hydraulic Cylindrical Grinders. Descriptions and complete specifications are included. A feature of the catalog is the fold-out inside the front cover which shows the new machine in two colors against a black background.

H-19 Alloy Steel

Jones & Laughlin Steel Corp.—A new 36-page brochure, "For Longer Wear, Less Repair," describes Jalloy, a new special alloy steel capable of being heat-treated to excellent physical properties. The booklet features a complete and entertaining presentation of Jalloy case histories in various fields. Also included is technical data with tables on chemical composition, grain size and various physical properties relating to surface hardness, yield strength, etc.

H-20 Gear Hobber

The Hamilton Tool Co.—A new bulletin gives complete information on the company's No. 00 Precision Small Gear Hobber for spur gears and pinions. Listed under Features and Advantages is a complete explanation of the machine's construction and operation. Capacities, clearances, etc., are detailed under Dimensions and Specifications.

(*Turn to page* 118, *please*)

TIME SAVER COUPON

THIS TIME SAVER COUPON is for your convenience in obtaining, WITHOUT OBLIGATION, more information on any one or more of the publications described above OR New Production and Plant Equipment OR New Products items described on other pages.

Readers' Service Department,
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How to keep a rubber gasket in its place

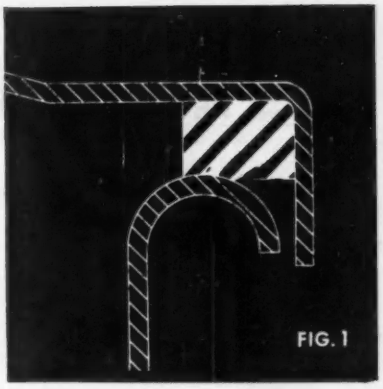
FIG. 1

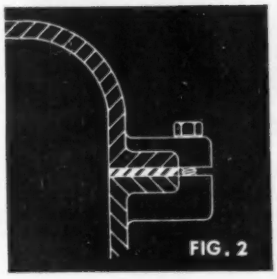
FIG. 2

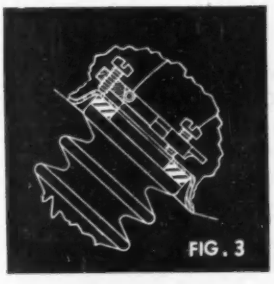
FIG. 3

Because rubber is noncompressible, straight rubber gaskets tend to flow out of place when subjected to flange pressure or the swelling action of oils and solvents.

To keep rubber gaskets in position, truly compressible cork particles are added to the noncompressible rubber. The resulting material compresses on itself, actually decreasing in volume. By varying the amount of cork, a range of compressibilities is provided as in Armstrong's Cork-and-Rubber. When lateral flow is eliminated, gaskets stay in place.

Fully as important as controlled flow are imperviousness and solvent resistance. In Armstrong's Cork-and-Rubber, cork particles are enveloped by a continuous matrix of synthetic rubber. Consequently, cork-and-rubber possesses the resistance to fluid penetration and solvents of a comparable straight synthetic rubber.

In figure 1, for example, cork-and-rubber replaced a straight rubber gasket when straight rubber tended to creep out of place and slip into the tank. Cork-and-rubber conforms to the rolled edge and surface irregularities in the stamped cover without slipping. Hence it provides a dependable pressure-tight seal.

Figure 2 shows the flange of an oil-filled water-immersed switch. Even when exposed to both liquids and the heavy flange pressures, truly compressible cork-and-rubber gaskets seal without creep.

In addition to sealing the transformer bushing shown in figure 3, cork-and-rubber cushions it against breakage. Even on oily flanges, creep is retarded by the surface friction of the exposed cork particles.

Versatile cork-and-rubber has solved many sealing problems. We suggest that you discuss your application with an Armstrong representative. He can help you select the right material for your particular application.

Send for this Gasket Handbook

You'll find useful application and specification data in the revised 24-page booklet, "Armstrong's Gasket and Sealing Materials." It contains up-to-date information on straight synthetic rubber, cork-and-synthetic-rubber, and cork composition gasket and sealing materials.

This booklet includes ten technical discussions of the factors influencing modern gasket and joint design. It also suggests methods of putting Armstrong's stock materials to specialized uses in such fields as radio, electrical, automotive, petroleum, and transportation industries.

For your free copy, fill in coupon at right and mail today.

ARMSTRONG CORK CO.
Gaskets and Packings Dept.
1501 Arch Street, Lancaster, Pa.

Please send me at once a free copy of the new 24-page booklet, "Armstrong's Gasket and Sealing Materials."

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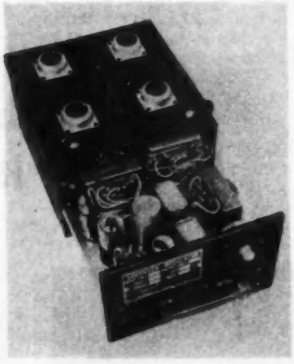
ARMSTRONG'S
GASKETS • PACKINGS • SEALS

NEW PRODUCTS for AIRCRAFT

For additional information regarding any of these items, please use coupon on page 56

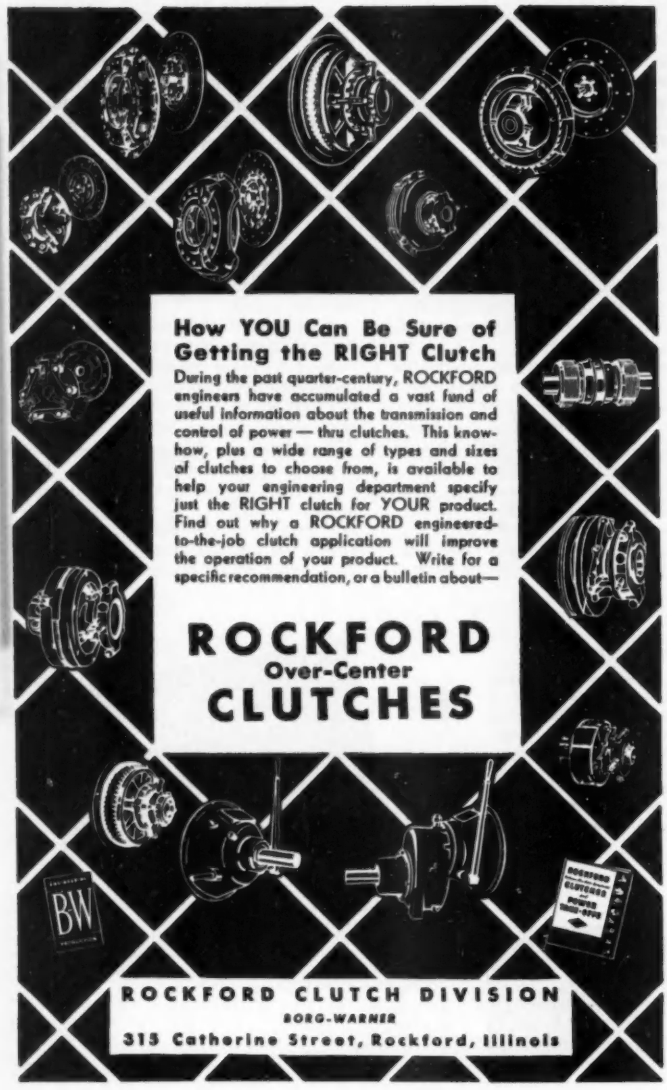
T-1—Electronic Voltage Regulators

Developed by Sorensen & Co., Inc., Stamford, Conn., a group of compact, lightweight AC line electronic voltage regulators and DC supplies operate from 115 VAC, 400 cycle line voltage. In general these are the specifications: Input voltage range is 95-215 VAC, 400 to 800 cycles. Output voltage is adjustable between 100-120 VAC. Regulation accuracy is 0.5 per cent. Power factor ranges down to 0.7 P.F. Single phase AC regulators are now available



Sorensen 400 cycle voltage regulator.

to 50 VA, 100 VA, 250 VA, 500 VA, 1200 VA, 2000 VA, 2500 VA. One regulated DC supply working from a 400 cycle line is now ready, rated at 28 VDC output with a load range of 2.5 to 10 amp. All units are fosterite treated for moisture and humidity protection.


How YOU Can Be Sure of Getting the RIGHT Clutch
During the past quarter-century, ROCKFORD engineers have accumulated a vast fund of useful information about the transmission and control of power — thru clutches. This know-how, plus a wide range of types and sizes of clutches to choose from, is available to help your engineering department specify just the RIGHT clutch for YOUR product. Find out why a ROCKFORD engineered-to-the-job clutch application will improve the operation of your product. Write for a specific recommendation, or a bulletin about—
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BORG-WARNER
315 Catherine Street, Rockford, Illinois

T-2—Radio Communication Unit

A radio communication unit for private airplanes, providing not only the usual low frequency transmitter but also a VHF transmitter with six channels, has been announced by the Trans-

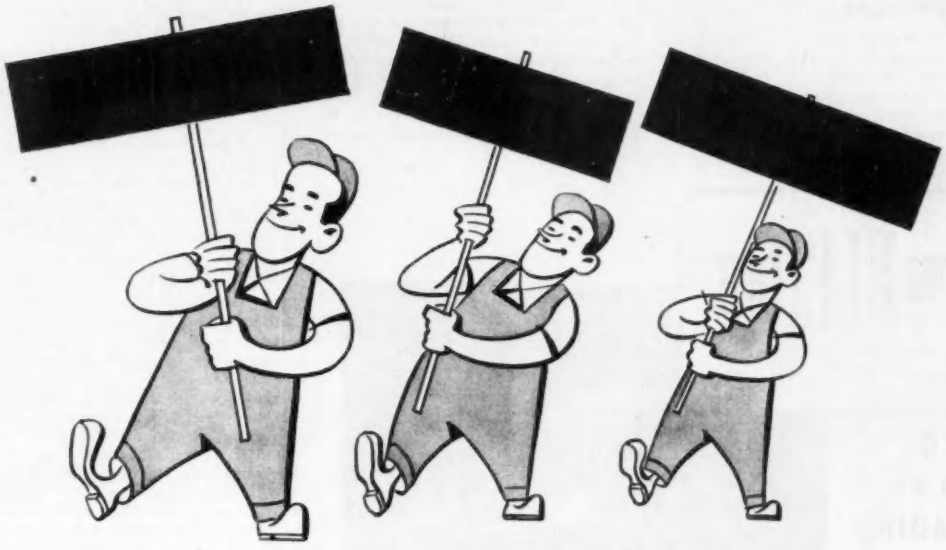
GE two band low frequency VHF transmitter mounted in Cessna instrument panel, and below that the low frequency transmitter and power supply being held beneath the panel. Unit is termed the AK-50

mitter Division of the General Electric Co., Syracuse, N. Y. The unit assures better air-to-ground contacts.

According to G-E engineers, when one signal fails to establish contact due to atmospheric disturbances, topographic interference, etc., the signal

(*Turn to page 72, please*)

Ostuco does all three...



ELECTRIC WELDED TUBING

Now you can cut production costs, improve product quality, and get faster deliveries, by using OSTUCO Electric Resistance Welded Steel Tubing, because OSTUCO has expanded facilities for doing *all three* tubing operations — manufacturing, shaping, and fabricating.

OSTUCO procures the raw materials . . . produces Carbon Mechanical Grades of electric welded steel tubing in a broad range of sizes and shapes . . . quickly meets your most exacting requirements in all types of fabricating operations. We are also in a position to supply the tubes painted or plated.

OSTUCO's single source operation eliminates unnecessary freight charges. Unified control of production assures highest quality. Speedy shipments enable you to operate with lower inventories. Prompt engineering assistance and job quotations without obligation. Write direct or to our nearest Sales Office for new free booklet "OSTUCO Electric Resistance Welded Steel Tubing."

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AIRBRIEFS

By Robert McLarren

Collier Trophy

In awarding the Collier Trophy for 1948 to the Radio Technical Commission for Aeronautics the awards committee has seemingly violated the spirit of the award, which is given annually for "the greatest achievement in aviation in America, the value of which has been demonstrated during the preceding year." A literal interpretation of this definition would exclude the RTCA as a candidate since the whole of its work to date has been of a paper planning nature only. This is not to be interpreted as the slightest criticism of the magnificent work this wholly voluntary organization of military, civil, radio, management and pilot aviation interests. The basic plan for an all-weather airline system developed by Special Committee SC-31 is an achievement of progressive thinking and cooperative action that is all-too-rare in the aviation business. The 10-year program will cost about $1.5 billion but will give the nation an ultimate "fool proof" airline system that weather cannot hamper. The first phase of the program, development of several special devices, is already being implemented and the "interim" phase of the program is expected to be in operation by 1955. However, it would appear that the historic significance of the famed Collier Trophy has been compromised by its award for a proposal instead of for an accomplished fact.

Aircraft Wages

The Bureau of Labor Statistics reveals that a janitor in the aircraft industry gets $1.12 an hour and a master mechanic is paid $1.82 an hour, the low and high in a survey of 51 selected jobs in 20 plants employing 140,000. The general average is $1.60 an hour. Largest class of shop personnel is assembler, which pays $1.52 for Class A and $1.31 for Class B. The survey also showed that: All but one plant operates on a 40-hr week, all but one plant uses a second shift made up of 22 per cent of the total employes, all plants pay a premium for second and third shift work, all plants observe paid holidays and vacations, seven plants have retirement plans, three plants pay the entire cost of their retirement plans and all plants have one or more types of insurance plans.

PAA-AOA Merger?

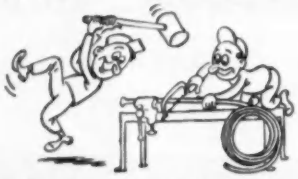
Recommendation that Civil Aeronautics Board approve the long-disputed sale of American Overseas Airlines by its owner, American Airlines, to Pan American Airways, made by CAB Examiner Tom Wren, injects an entirely new note into the year-old proceedings. It gradually had become a foregone conclusion among close observers that the Board would disapprove the plan since it obviously would reduce "well regulated" competition on the trans-Atlantic routes. However, since all international route allocations must be approved by President Truman, who has more than a nodding acquaintance with Pan American president Juan Trippe and his top executives, it had also been suggested that the President might reverse the CAB's decision and approve the plan anyway. This latter event now seems academic in view of the recently-issued examiner's report.

While CAB does not always follow the recommendations of its examiners, in a matter of such magnitude and con-

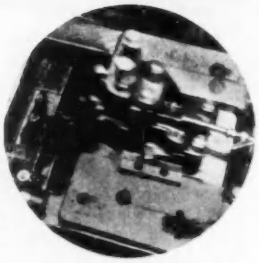
(*Turn to page* 120, *please*)

ELCO Screws

ELCO COLD HEADING PUTS QUALITY IN "THE SCREWS YOU LIKE TO USE"



Cold Heading is simply taking the end of a piece of steel wire (or iron, or brass, or aluminum, or even stainless steel)—and mashing it down to form the head for the screw, or bolt, or special piece. We use special dies, of course, to do the forming and we get accurate, uniform results because of our careful inspecting. Cold heading is fast, too, and economical, and versatile — we recently redesigned an assembly over to cold heading, and are saving a customer $48.15 every thousand pieces. Cold heading, with the right kind of dies, produces smoother, stronger, cleaner, more uniform, more accurate screws — ELCO Screws.



Close-up of a Smash Hit

That die holder is going like the dickens — 225 pieces a minute, two raps per piece — to make heads on 8-32x¾" round head machine screws.

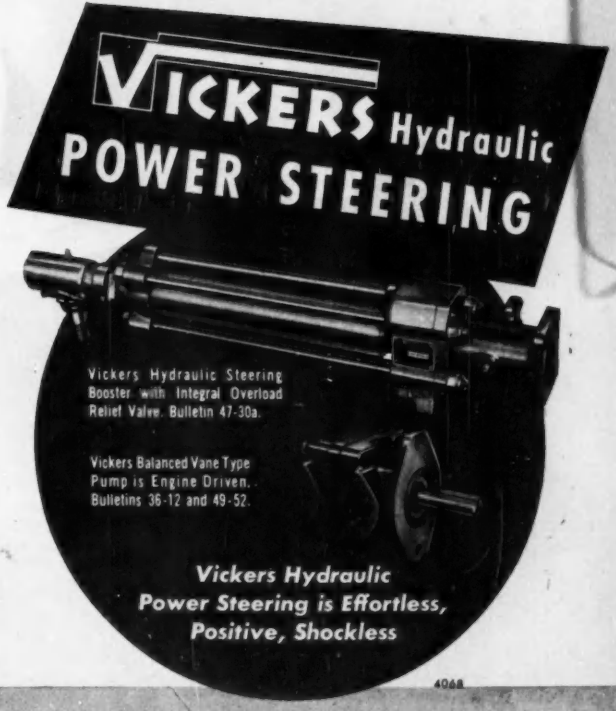
ELCO TOOL & SCREW CORP., 1914 Broadway, Rockford, Ill.

Safe Steering in Emergencies with

When forced off the road onto rutted, soft, rocky or snow-banked shoulders, your driver will be grateful for Vickers Hydraulic Power Steering. The steering mechanism is then hydraulically locked against road condition reaction . . . the vehicle cannot swerve from road reaction. There is no "wheel fight" to wrench the steering wheel out of the driver's hands. Pull back onto the road requires only the "force of a finger" on the steering wheel.

Vickers Hydraulic Power Steering is safer . . . effortless . . . provides hydraulic power at instant command of the driver to meet any and all steering requirements. This extra-quick steering greatly increases the ability to maneuver in an emergency. Another important advantage . . . the driver is less tired, more alert.

Vickers Hydraulic Power Steering can be used as original equipment, or adapted to most trucks and other vehicles now in service. Write for Bulletins 47-30 and 49-52 covering additional advantages and specifications.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POWER STEERING
Vickers Hydraulic Steering Booster with Integral Overload Relief Valve. Bulletin 47-30a.
Vickers Balanced Vane Type Pump is Engine Driven. Bulletins 36-12 and 49-52.
Vickers Hydraulic Power Steering is Effortless, Positive, Shockless
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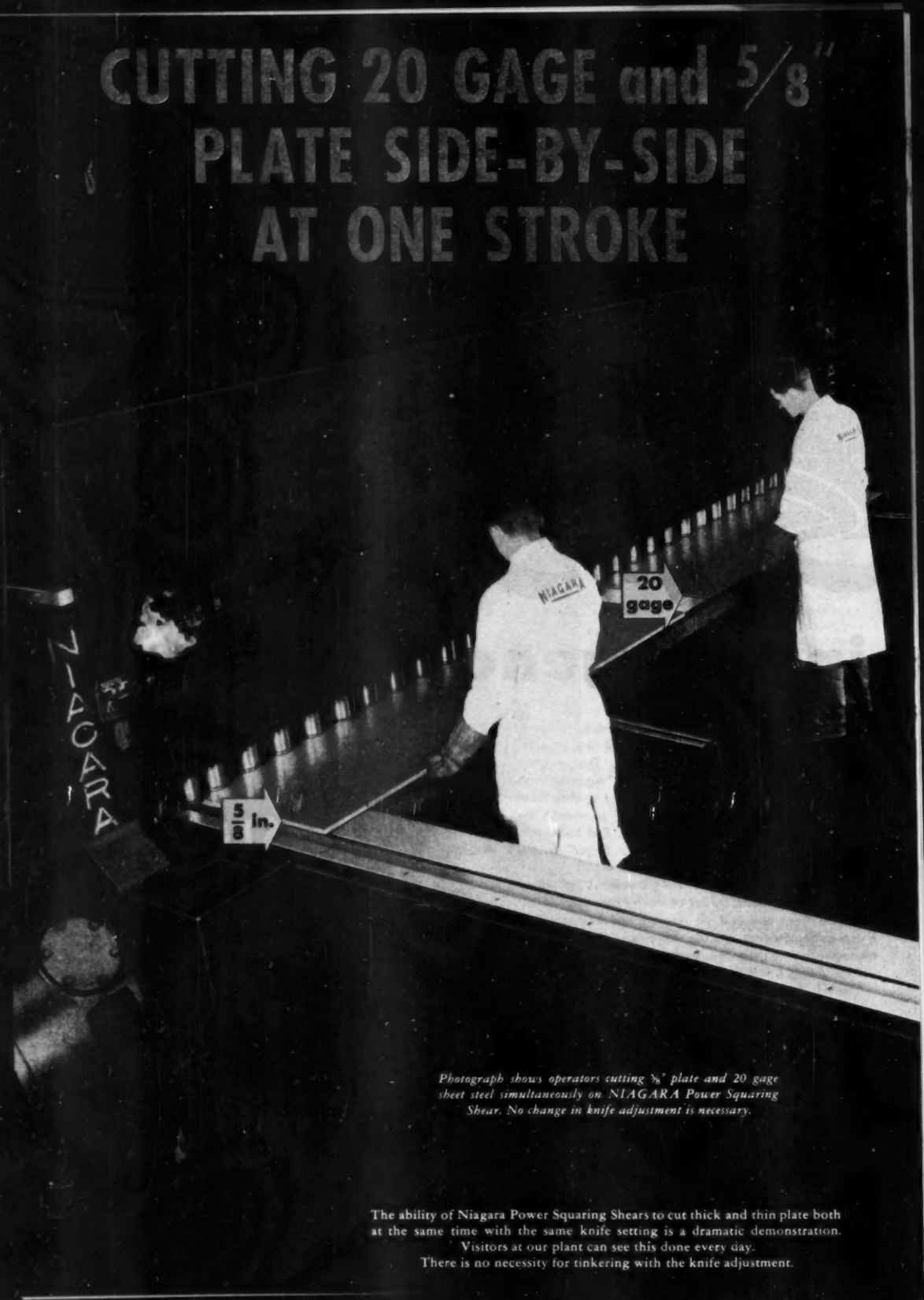
ENGINEERS AND BUILDERS OF OIL HYDRAULIC EQUIPMENT SINCE 1921

CUTTING 20 GAGE and 5/8" PLATE SIDE-BY-SIDE AT ONE STROKE



Photograph shows operators cutting ⅝" plate and 20 gage sheet steel simultaneously on NIAGARA Power Squaring Shear. No change in knife adjustment is necessary.

The ability of Niagara Power Squaring Shears to cut thick and thin plate both at the same time with the same knife setting is a dramatic demonstration. Visitors at our plant can see this done every day. There is no necessity for tinkering with the knife adjustment.

Demonstrates The Sound Engineering Design of

NIAGARA

POWER SQUARING SHEARS

● There is no compromise with sound, proven engineering when it comes to NIAGARA shear design and construction.

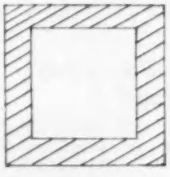
Accurate cutting depends primarily on rigidity of the shear's components.

For bed, crosshead and holddown NIAGARA uses CLOSED BOX SECTIONS to resist with minimum deflection the horizontal, vertical and diagonal or torsional loads to which every shear is subjected.

NO OTHER SECTION WILL DO THIS JOB AS EFFICIENTLY.

Angle or channel shaped sections have long since been abandoned for use on NIAGARA Power Shears.

The economy of quality is remembered long after price is forgotten.



BED, CROSSHEAD & HOLDDOWN DESIGN

NIAGARA MACHINE AND TOOL WORKS, BUFFALO 11, NEW YORK

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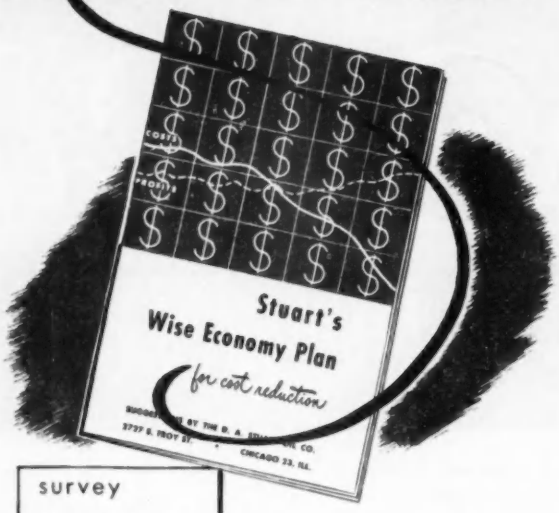

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NEW PRODUCTS

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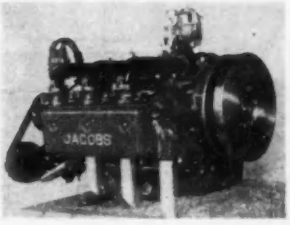
(*Continued from page* 54)

bearing temperature measurement, generator-and transformer-winding temperature indication, refrigeration and air conditioning testing, drying operations, remote fluid temperature indication, and scientific laboratory work.

K-15—Liquid Cooled Marine Engine



Jacobs liquid cooled marine engine

Horizontally opposed liquid cooled marine engines built to aircraft specifications and quality and fully tested for all types of marine use, are offered by the Jacobs Aircraft Engine Co., Pottstown, Pa.

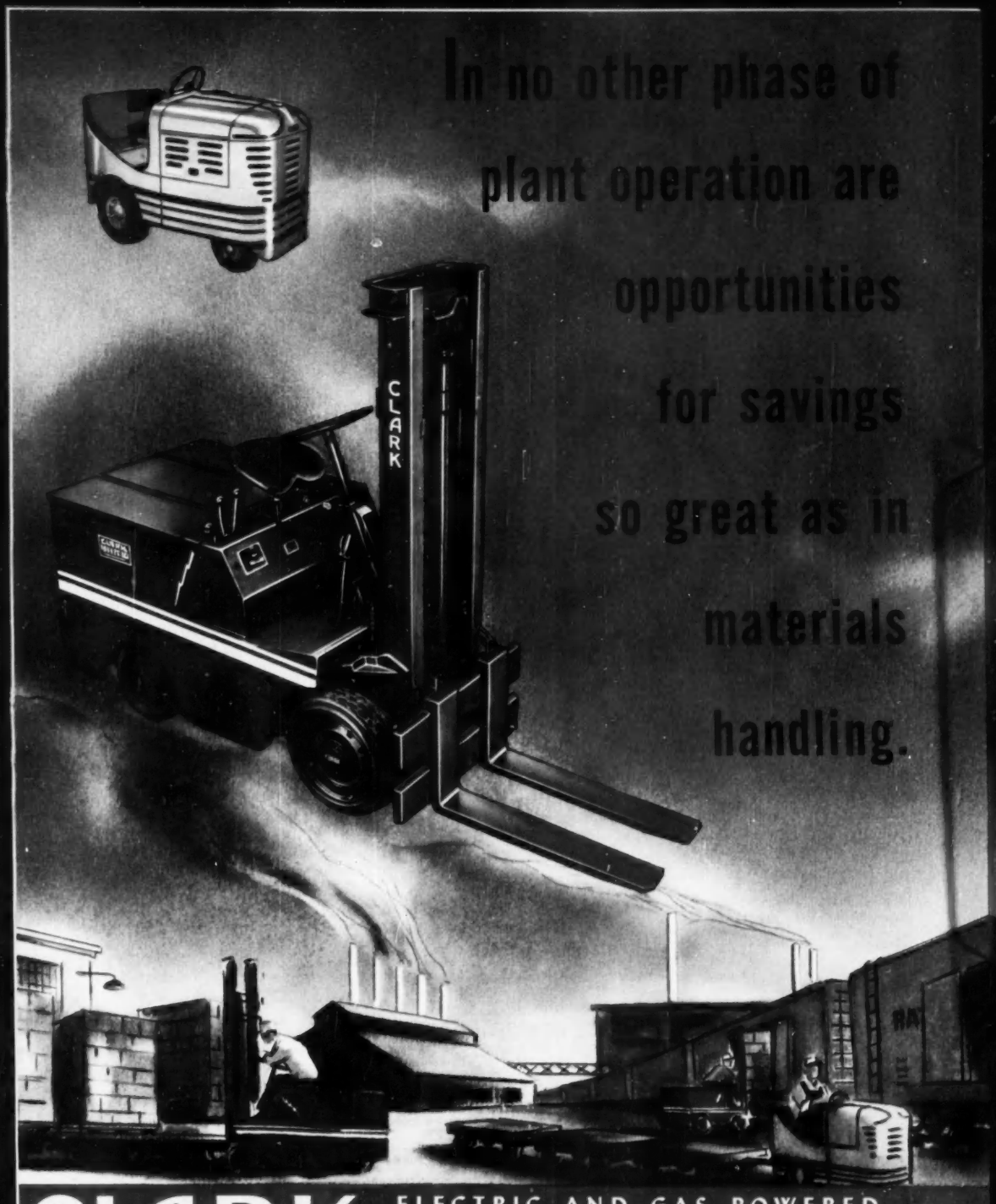
Six cyl 150 hp model has a displacement of 361 cu in., a dry weight of 425 lbs, bore 4.375 in., stroke 4.000 in., length 34 in., width 32 in., and height of 30 in.

Four cyl 100 hp model provides a displacement of 241 cu in., a dry weight of 330 lbs, bore 4.375 in., stroke 4.000 in., length 27 in., width 32 in., and a height of 30 in.

K-16—Packaging Tape

Made with glass, "Scotch" brand filament packaging tape No. 890 has been unveiled by Minnesota Mining and Mfg. Co., St. Paul, Minn., as the world's strongest tape with a pressure sensitive adhesive of special value in extra heavy duty strapping of fibreboard cartons, and in banding hundreds of lbs of steel coils and pipes for domestic and foreign shipment. For palletizing jobs, the tape is expected to be especially valuable due to its minimum stretch under tension (six per cent as compared to 15 per cent for its predecessors). Other jobs for the new tape are expected to include banding raw lumber, wall board, window

(*Turn to page* 78, *please*)



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Speed with Safety is the rigid rule in this complete, integrated lubricant plant of the Socony-Vacuum Oil Company, with its storage capacity of more than a million gallons—and substantial benefits are the inevitable by-product. Oils and greases are blended and compounded in huge mixing kettles under direction of a modern control laboratory, and are piped directly into containers ranging from 55-gallon drums to one-quart cans, which travel on conveyors. Cases are filled and sealed automatically.

At the end of the conveyor lines, both drums and cases are palletized and Clark fork trucks take charge—a Carloader* inside, a Yardlift-40* outdoors. For the most part, manual methods have gone the way of practically all outmoded practices.

Benefits of Clark mechanization were immediate: increased warehouse capacity through use of air rights and efficient orderliness; increased productive capacity resulting from quickened flow and faster turnover of material; and a sharp reduction in accidents and damage losses.

In addition to their routine handling duties, the Clarks are highly regarded as versatile "utility men" for maintenance work and other lifting-and-carrying chores.

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55-gallon drums and barrels are stored in the yard—in twos horizontally on a cradle pallet, or in fours vertically on a conventional pallet. Barrel racks for stacking, and heavy, hazardous lifting are things of the past.

CLARK ELECTRIC AND GAS POWERED **FORK TRUCKS**
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(*Continued from page* 52)

The box type slide has a power elevating unit consisting of a worm driven barrel type connection. The slide is completely guided by long gibbing throughout any position of stroke and adjustment. Gibbing is designed so that the slide and bolster are the same area from right to left. Flat gibbing is used on the pressure side of the slide, and adjustable 45 deg gibs are used on the other side.

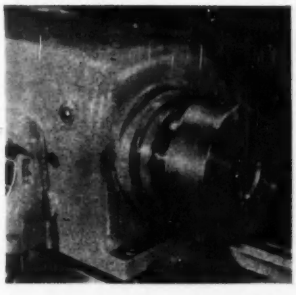
The main drive is fully eccentric, having a twin drive for balanced loading. The main shaft rotates in the crown bearings and does not carry torsional load.

A cascade oil lubricating system is used throughout except for the gibways and roller bearings, which are grease lubricated.

Joint Industry Conference standards for bolster and slide dimensions, and for location and size of T-slot holes, pressure pin holes and other construction features are reported to be engineered into the new line.

J-13—Automatic Work Driver

Designed specifically for use on all Monarch lathes having either a 6 in. type D-1 spindle nose or a 6 in. type A-1 spindle nose, a new automatic work driver of the serrated jaw type is now



Automatic work driver for Monarch lathes

in production at plant of the Monarch Machine Tool Co., Sidney, Ohio.

The device is applicable to the series 60 engine and toolmaker's lathes, for production operations such as those utilizing "Air-Gage Tracer" or "Motor-Trace" controls. It is applicable to Mona-Matic Lathes, for high-production between center work. And it is applicable to Uni-Matic Lathes, when arranged for high-production between center work. The accessory is recommended for in-between center operations of all types where marking of the driving surface is permissible.

It is far easier for the operator to load and unload this new work driver than previously possible with other drivers of this kind, the manufacturer reports. When the spindle is started, a lever arm actuated jaw clamps the work so that the heavier the cut, the harder the driver pulls.

If the spindle is stopped quickly, the driver opens automatically. However, should the spindle be stopped gradually, it is necessary for the operator to rotate the outer portion of the driver slightly, freeing the work for removal.

This automatic work driver is sup-

(*Turn to page* 68, *please*)

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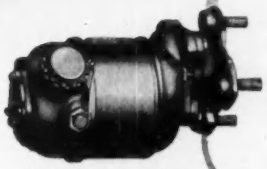
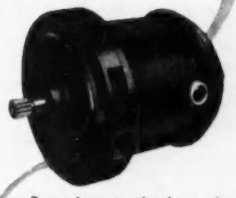
Lamb Electric MOTORS



Sturdy and reliable, explosion proof construction, helical geared fuel transfer pump motor.



Rugged construction is a major factor in the reliability of this motor widely used in the field of mechanized equipment.

• Every Lamb Electric Motor is specially designed for the product or device it is to drive. This means that both electrical and mechanical characteristics are engineered for the exact requirements of the particular application, which often results in savings in space, weight, and cost factor.

Special engineering in Lamb Electric Motors assures optimum product performance, and efficient, long-life motor operation...another reason why more and more of America's finest products are being powered with Lamb Electric Motors. *The Lamb Electric Company, Kent, Ohio.*

Lamb Electric SPECIAL APPLICATION FRACTIONAL HORSEPOWER MOTORS

• PRODUCTION • NEW EQUIPMENT • PLANT •

(*Continued from page 67*)

plied with two sets of standard jaws. One set has a capacity of from 1 in to 2¼ in.; the other of from 2¼ in to 3½ in. Also available is a third set with a capacity of from ½ in to 1¼ in. Although roughing jaws will be furnished to meet average requirements, Monarch also plans to supply in the same three ranges "finishing jaws" having more shallow serrations.

The various sets of jaws are interchangeable in the body. Each set is adjustable over its entire range. Since the jaws are of the floating type, they will compensate for a seasonable amount of eccentricity.

In the early days of flying, speed was limited and not too much attention was paid to the paint finish. However, fast-flying aluminum airplanes of today are subjected to severe exposure conditions, which create two serious problems — making paint stick and protecting the metal.

These problems — common to all products fabricated of aluminum — have been successfully solved by the use of

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ALODIZING gives aluminum a protective coating which bonds paint and resists corrosion.

The ALODIZING process is simple, rapid, economical. It requires no electrical equipment, no high temperatures, no special skill or technical training. "ALODINE" can be applied in a dip, spray, or brush process.

Products that are Alodized are "extra-value" products. Tell your customers — tell the world — you are ALODIZING. Specify "ALODINE" for the utmost in protective quality.

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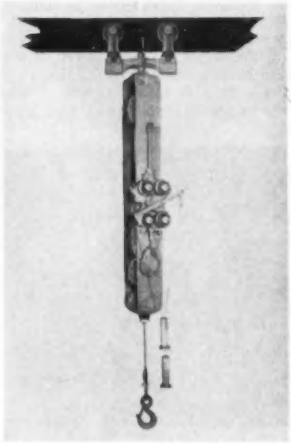
J-14—Dual Load-Balancing Hoist

A dual load-balancing hoist being manufactured by the Platz Co., Inc., Detroit, Mich., is designed to neutralize the weight it is carrying and to suspend such object in any position, with very little energy required to raise or lower. Its "cat-paw" action eliminates operator fatigue and serves to cut tool and fixture maintenance costs by eliminating dropping or banging. This dual load-balancing hoist hangs from a 4 or 6 in. standard I beam, swivels vertically from 0 to 17 deg with rotation of 360 deg, and is offered in balancing ranges of 36 and 42 in. Operation on Cleveland Tram-rail or American Monorail requires extra equipment.

In lifting a casting weighing 135 lb the special hook or cradle to be used in this case weighs 30 lbs—making a total load of 165 lbs. Low pressure side of the balancer is then adjusted to balance the 30 lb weight of this hook or cradle and the high pressure side of the balancer is adjusted to balance the total 165 lb load. High and low pressure is applied by a convenient hand control.

After the hook or cradle is engaged with the casting to be balanced, the high pressure handle is pulled. Immediately the load becomes neutralized.

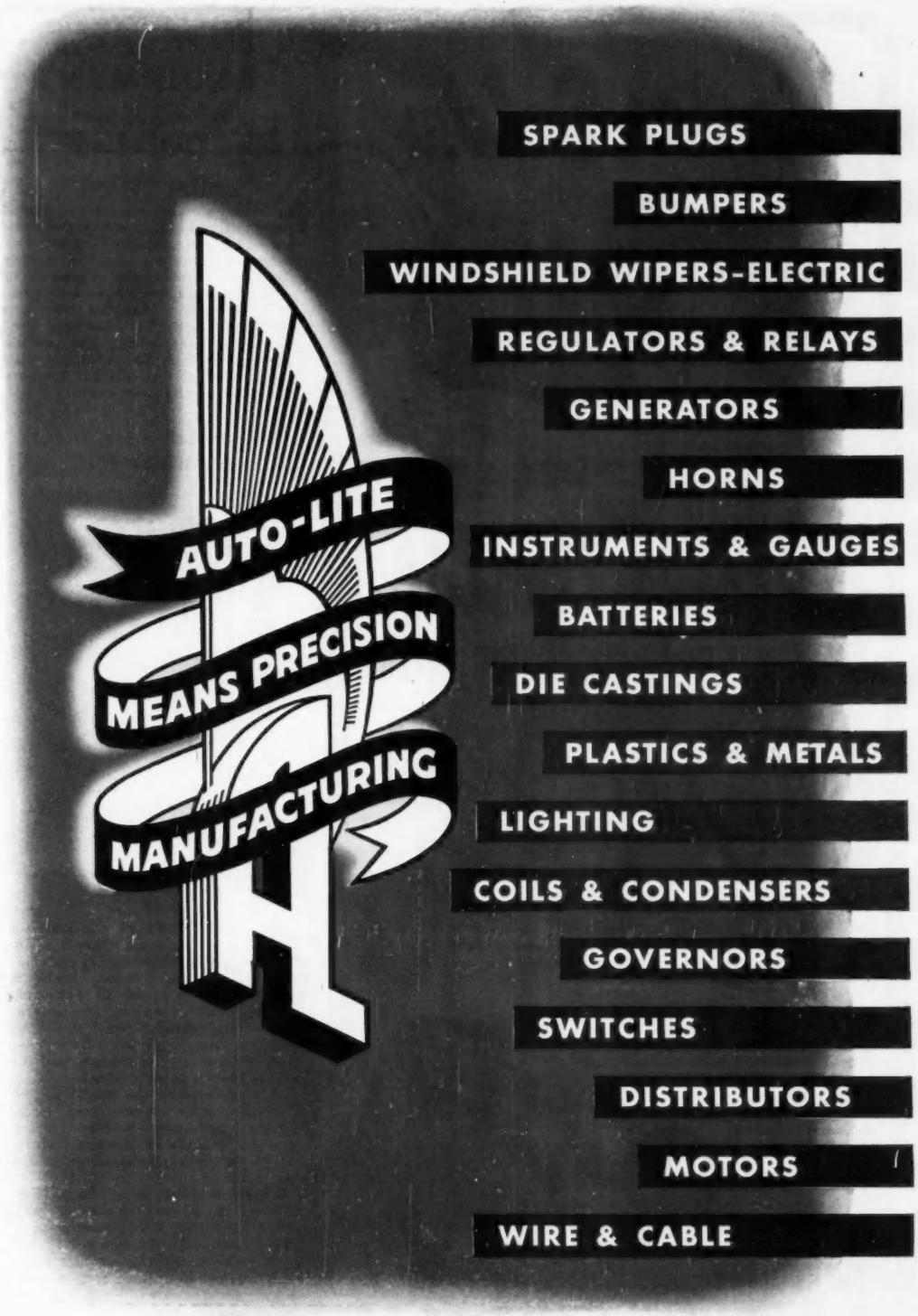


Platz dual load-balancing hoist

Both hands can now be used to quickly move the casting up and into position in a precision fixture with cat-paw action. Time required for this movement is said to be 4 to 6 seconds.

By cat-paw action is meant absolute suspension in the fixture a few thousandths, a sixty-fourth, etc., of an in.—

(*Turn to page 70, please*)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Kester engineers, with over 100,000 different types and sizes of solder available, will specify the right flux-core solder that will give maximum efficiency and economy to the job.

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Using the most suitable solder for each operation will enable solderers to work at top speed without sacrificing quality. Waste is eliminated and rejects are held to a minimum.

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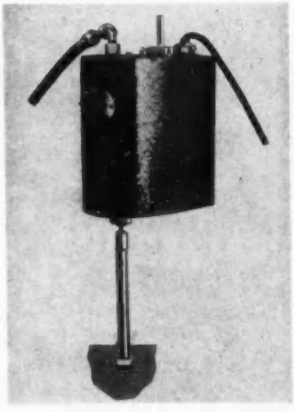
(*Continued from page 68*)

or whatever desired space is required for rotating the casting until the locating stops are properly located. This action includes pressing the casting down into position with a pressure of a few lbs and releasing the high pressure. There is no banging down into the fixture with its consequent need for shifting the casting into position with a crow-bar; for when the high pressure is released, the low pressure is applied, by the same action.

J-15—Metal Disintegrator



1950 Thomas Metalmaster Junior, offered by the Clinton Machine Co.

The 1950 Thomas Metalmaster Junior, a self-contained metal disintegrator now in production at the Clinton Machine Co., Clinton, Mich., is rated by the company as extremely compact, easily handled and attachable to any standard drill press for removing taps, drills, etc., from holes without distorting the threads, and for cutting shaped holes in dies.

It is operated by the simple process of chucking it up in a drill press, selecting the proper size electrode, turning it on and, with its self-feeding feature, letting the Junior Metalmaster do the rest.

It removes broken taps from an 0.080 to 1 in., and is used to take out any broken tools, taps, studs, reamers, pins, plug gauges and drills. Shapes of holes it will cut in carbides or any other hardened metals, include rounds, open squares, blind squares, hexagonals and various pinion shapes.

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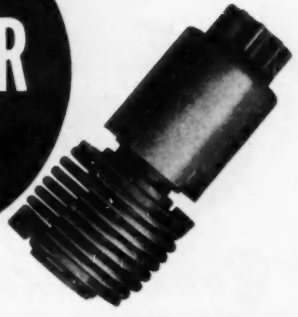
you can do it

BETTER–
MORE ECONOMICALLY

with the

Bendix STARTER Drive



There isn't a better proven, more simply designed, or more easily mounted starter drive than the Bendix* Drive. Over 79,000,000 have been installed. It has fewer parts than any other starter drive system. Its compactness lets you mount starting motors almost anywhere. These are the basic reasons why Bendix Starter Drives are preferred by most manufacturers. Cost-wise and performance-wise—from installation to service—it's the most economical starter drive you can buy! Look into Bendix Starter Drive cost savings. Your inquiries will receive immediate attention.

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NEW PRODUCTS for AIRCRAFT

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(*Continued from page 58*)

from the other transmitter has a good chance of getting through.

The new communication package, known as the AK-50, also includes a two-band low frequency receiver for broadcast reception, navigational range signals, weather reports and tower communication.

A feature of the receiver is a pre-set "tower" tuning position. By moving a switch, the pilot can change from a radio-range frequency to the tower frequency without changing the setting on the main tuning dial. It is designed to help the pilot make safe contact with control towers while he is busy in the traffic circle or at a crowded airport.

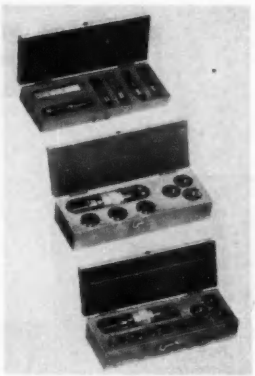
Other features on the new communication combination include a built-in interphone system and a noise limiter to facilitate reception through heavy static which formerly made radio contact impossible.

The AK-50 includes two transmitters, a receiver and power supply unit.

T-3—Lockbolt Inspection Kits

Three new sets of accessory tools for use with Huck lockbolts are now in production at Aircraft Tools, Inc., of Los Angeles, Calif.

The AT-590D inspection kit, consisting of a grip gage, engraved scale, and two sets of pin and collar gages, is available in a fitted wood case. The

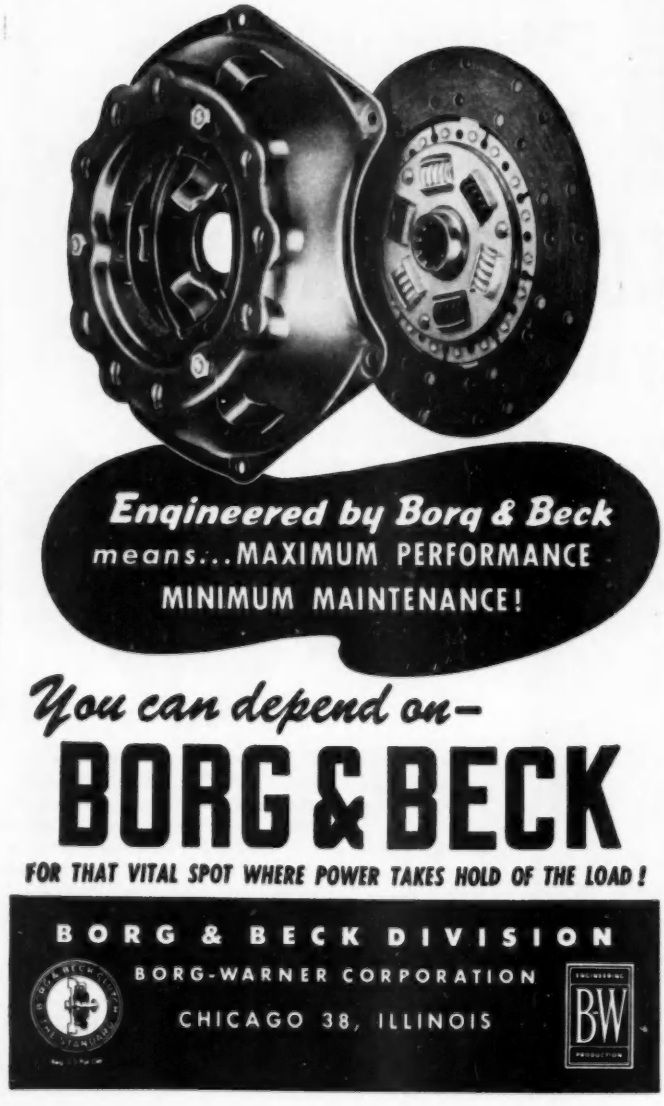


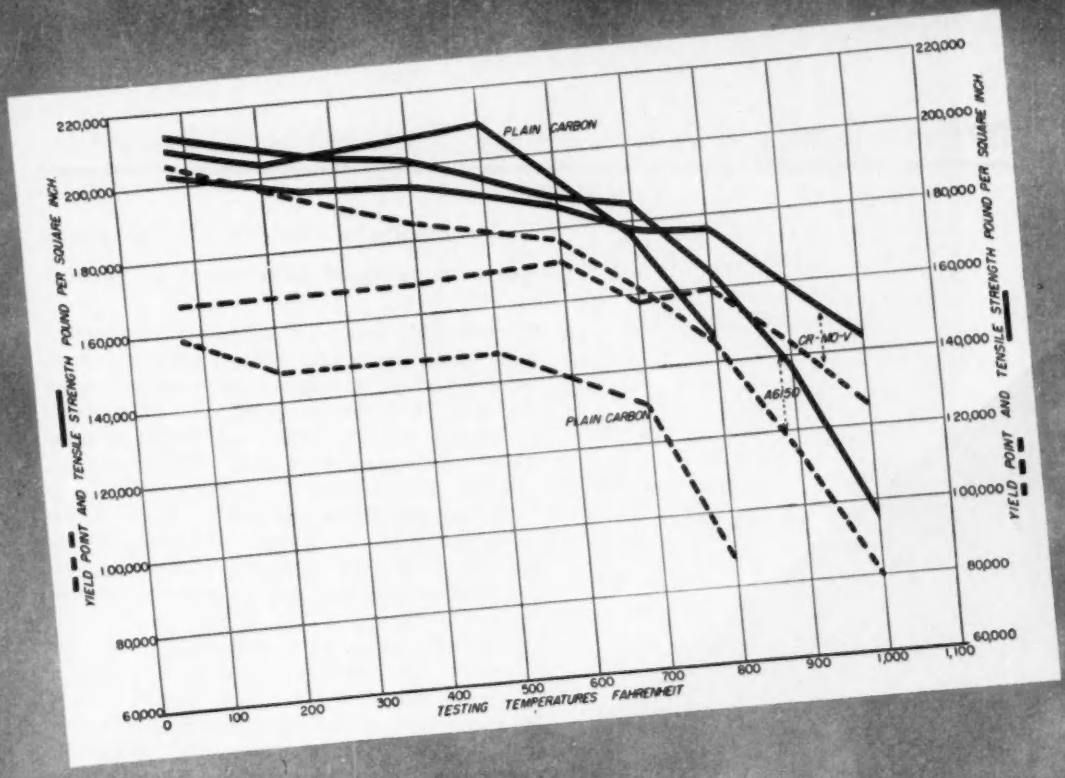
Aircraft Tool Co.'s AT-590 inspection kit, lockbolt collar removing kit AT-590B and Lockbolt master kit AT-590A

grip gage enables quick choice of the proper lockbolt for specific sheet thickness. The pin gages check the length of the fastener after the installation, and the collar gages ascertain the degree of completeness of the swaging. A simple "go" and "no-go" style enables these gages to be used by even the most inexperienced workers to determine accuracy of an assembled lockbolt.

The Huck Lockbolt collar removing kit, AT-590B, contains a micro-set stop-countersink, three interchangeable guide collars, and three cutting tools, for removing 3/16 and ¼ in. dia lockbolt collars and also structural blind rivets. The stop-countersink has spring retraction, positive self-locking skirt adjustments, graduated in increments of 0.002, and an integral cutting-tool

(*Turn to page 76, please*)





HIGH TEMPERATURE PROPERTIES

of Cr-V and Cr-Mo-V Spring Steels

SPRINGS FOR SERVICE at elevated temperatures require steels which resist softening and lowering of the yield point. Unless hardness and yield strength are stabilized by correct alloy additions to the steel, these properties deteriorate rapidly as the temperature is raised.

The chart above shows the yield point and tensile strength of three types of spring steel at elevated temperatures determined by standard short-time tension tests.

Springs of plain carbon steel are sometimes used at moderately elevated temperatures, although their lower yield values prevent them from giving service as satisfactory as that of the alloy spring steels.

Chromium-vanadium steel springs, such as AISI 6150, give better service at ordinary temperatures because of the higher yield point. In addition, they may be used at operating temperatures up to about 700° or 750° F because they retain high yield point values as the temperature is increased.

Chromium-molybdenum-vanadium steel was especially designed for springs operating at temperatures in excess of 750° F. It can be used for springs operating at temperatures as high as 850° F or even higher under some conditions. At 800° F, the yield point of this steel is still greater than that of plain carbon steel at room temperature.

If you have a problem in spring applications at elevated temperatures, our metallurgical engineers will be glad to help you solve it.

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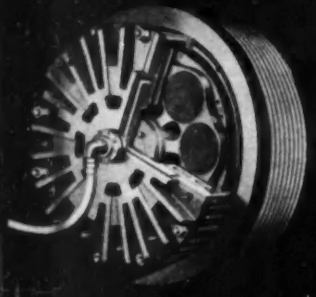
Proving the New Danly Clutch

...in 6 months of continuous 2 shift press operation without adjustment or repair!

This 500 ton press in one of the country's leading automotive plants has run 16 hours a day for over six months... single stroking over 300 times every hour! During this time, the new Danly cool-running clutch hasn't even required adjustment for lining wear! Clutch maintenance, a main item of stamping cost, was virtually eliminated!

A record like this is typical of Danly clutch performance. Danly cool-running clutches are able to outwear conventional clutches consistently because they beat heat, the most destructive element of wear in press clutches.

Less heat is generated when the Danly clutch engages because ingenious design has eliminated a large proportion of the pick-up load involved in starting clutch parts. Forced air cooling dissipates what little heat there is so that the Danly cool-running clutch, under full load, operates only 35° above room temperature . . . . just barely warm!



Cut-away view showing special method of lining mounting in the new Danly cool-running clutch. Discs of lining material are retained in a "spider" without riveting.

Close-up of stamping of operation performed showing finished lower radiator grill bar. Two pieces are formed at each stroke.

CHECK THESE
EXCLUSIVE DANLY PRESS FEATURES

- ✔ cool-running clutch
- ✔ extra rigidity
- ✔ complete pressure lubrication
- ✔ special controls—sensitive reaction
- ✔ precision construction

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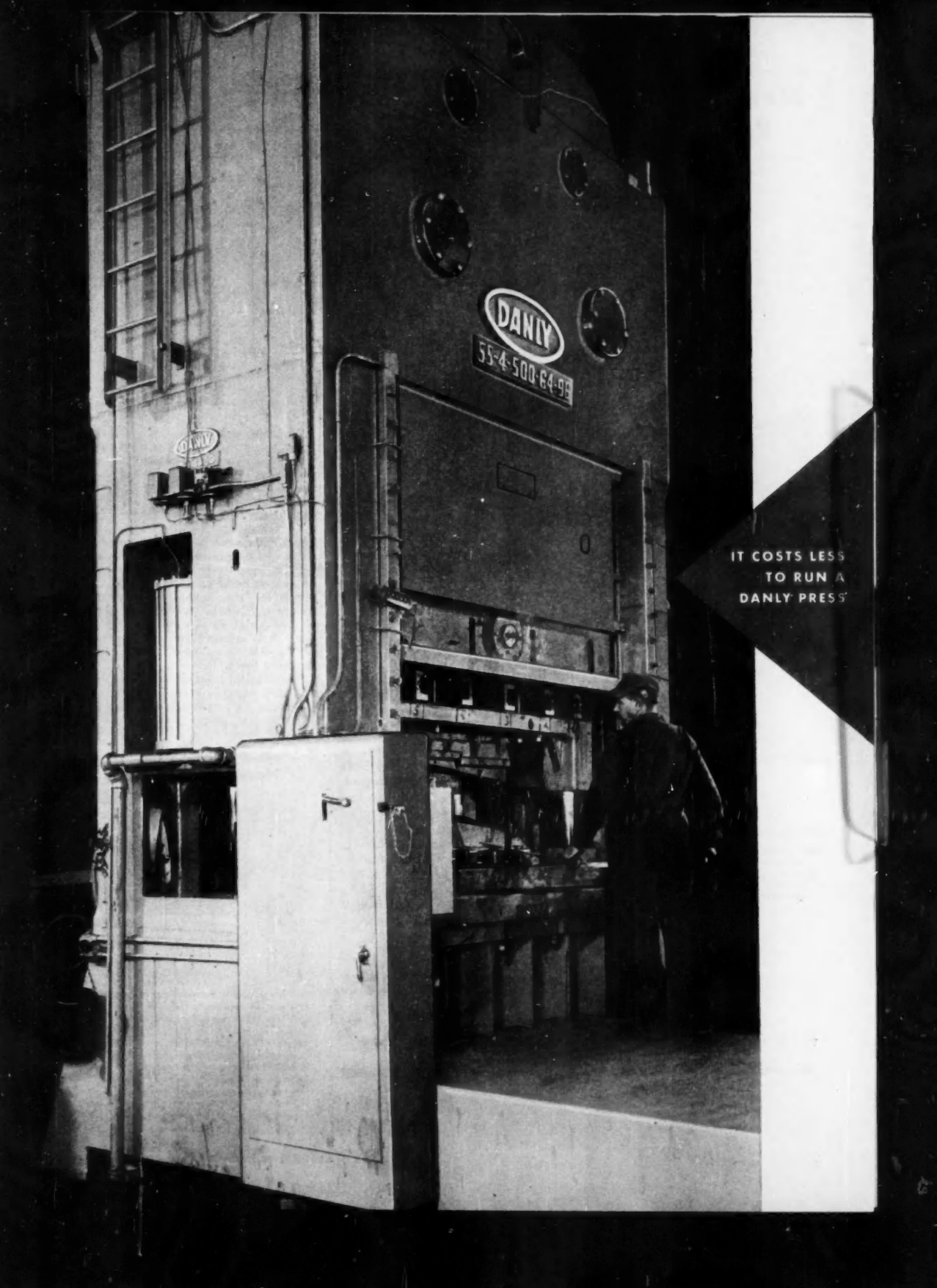
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55-4-500-64-9E
IT COSTS LESS
TO RUN A
DANLY PRESS

New AIRCRAFT PRODUCTS

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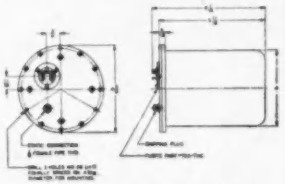
(*Continued from page* 72)

ejector (or knockout pin) that facilitates cutter removal. It incorporates precision radial and thrust bearings.

The Huck lockbolt master kit, AT-590A, is composed of the entire collar removing set plus four countersink cutters. Countersink cutters are for use in installing aluminum lockbolts in 75ST material. A slight included angle in the cutting edge at the junction with the pilot pin provides a tapered entrance into the sheet to be fastened.

T-4—Altitude Controller

The Square D Company's Kollsman Instrument Division, Elmhurst, N. Y., has developed the Kollsman altitude controller, an aneroid actuated mechanism for controlling the automatic pilot when corrections in the flight path are required to maintain a selected altitude. This is accomplished by use of the recently developed Kollsman synchrotel which is connected to the altitude controller through a d-c magnetic clutch. When the magnetic clutch is engaged, the altitude controller, overriding the gyroscope, compels the autopilot to hold a constant altitude.



Outline drawing of the new Kollsman altitude controller

Weighing only 25 oz., the new instrument has such low friction that under flight conditions it is responsive to as little as two feet of altitude change. Six times the diaphragm power required for a standard altimeter is used in the instrument to increase reliability.

Loss of accuracy, due to high G-loads during maneuvering at jet speed, is prevented by a novel method of balancing the acceleration force of one pair of aneroid cells against another. This eliminates the linkage and counterweight that would otherwise be required. A special clutch which does not jog when it is engaged has been designed for greater passenger comfort and smoother flight.

The electrical output of the altitude controller at sea level is compatible with operating requirements of various types of automatic pilots.

T-5—Hand Hardness Tester

Fabricated plastic or non ferrous metal parts can now be rapidly tested with the hand hardness tester placed on the market by Barber-Colman Co., Rockford, Ill. Suitable for spot checking of stock, this new impressor is designed for use in any position, in any area which will permit the operator's hand. Capable of accurate readings even when operated by inexperienced personnel, the impressor is equipped with a conveniently located dial which indicates material hardness.

D. V.—1

Know These Features:

- Full seating pressure for quick warm-up
- Powerful spring to control high pump pressure
- Positive-acting, accurate thermal element for most efficient performance in atmospheric and sealed cooling systems.

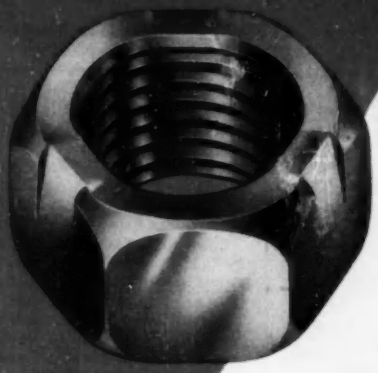
Old ideas were scrapped when Dole DV Thermostats were developed. Entirely new in basic principles and construction, they satisfy the strictest requirements of modern engines. With Dole DV's the designer finds it possible to use smaller radiators, higher pump pressure, high set pressure caps and increase efficiency of pumps. Dole DV's are a practical answer to today's design needs. Four types give broad coverage of engine specifications.

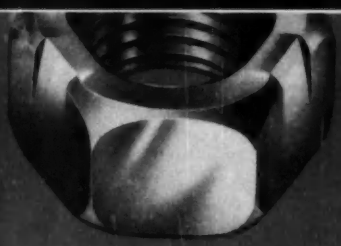
DOLE DV THERMOSTATS

CONTROL WITH DOLE

THE DOLE VALVE COMPANY • 1901-1941 Carroll Avenue, Chicago 12, Illinois

Philadelphia • Detroit • Los Angeles





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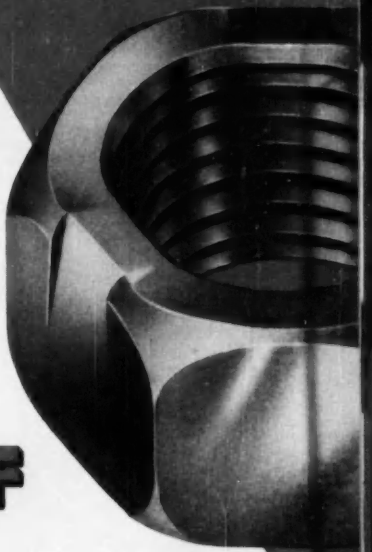
Announcing.

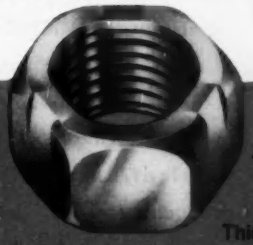
TRI LOK

TRADE MARK

by SHAKEPROOF

T.M. REG. U. S. PAT. OFF.





self-locking nuts . . .

This newest member of the Shakeproof line of engineered fastenings offers industry many outstanding advantages in both assembly efficiency and in product performance. It is a "free-starting" nut that assembles quickly, holds tightly with a powerful thread-gripping action, and, can be re-applied repeatedly.

Shakeproof engineers, ever mindful of the high standards they have set in fastening development, experimented with many similar principles before adopting this device. It is typical of the careful, thorough and practical approach Shakeproof uses in meeting the fastening needs of America's mass-assembly manufacturers!

SHAKEPROOF Inc.
DIVISION OF ILLINOIS TOOL WORKS
2501 North Keeler Avenue, Chicago 39, Illinois

The ABC of MST

Michigan

The Modern Electric Resistance

WELDED

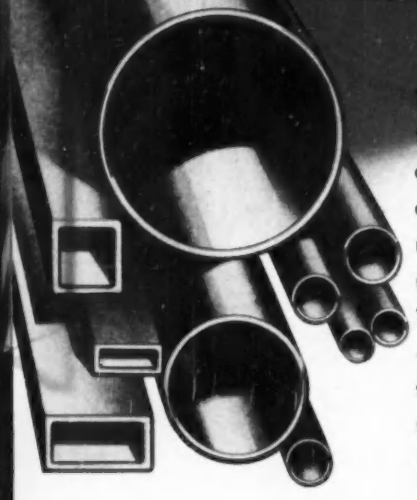
STEEL

TUBING

ROUND

SQUARE-RECTANGULAR

A LWAYS MAKES POSSIBLE
B ETTER PRODUCTS
C AT LOWER OST



Thousands of products, from intricate automobile and truck parts to furniture and vacuum cleaners, are made better and more economically with MICHIGAN TUBING. We invite you to consider the many advantages of using it in the fabrication of YOUR product.

A Quality Product, can be worked in your plant or prefabricated by MICHIGAN.

Consult us for engineering and technical help in the selection of tubing best suited to your needs.

RESISTANCE-WELDED-STEEL-TUBING

Michigan STEEL TUBE PRODUCTS CO.

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NEW PRODUCTS

For additional information regarding any of these items, please use coupon on page 56

(*Continued from page* 64)

frames, carton shipments of all kinds, plate glass, and machinery parts. It is applied by being hand-wrapped around a load and back on itself. It sticks immediately on contact.

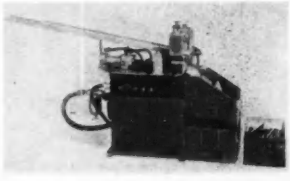
The third filament tape announced by the 3M company this year and declared nearly three times stronger than the first two tapes, this new tape has an acetate film backing, and has glass filaments instead of rayon amounting to thousands of parallel filaments that run lengthwise with the tape. The filaments are permanently imbedded in a resilient, shock-proof rubber adhesive on the tape, reinforcing the tape "like steel rods reinforce concrete."

The new tape provides 500 lbs of tensile strength per in. of width, compared to a tensile strength of 175 lbs per sq in. claimed for the two previous tapes. Its shock resistance is twice as great and its tear resistance is greater than can be measured on the ASTM-approved Elmendorf tear tester, it is said.

The new tape is made in 72-yd lengths, and in standard widths of ½, ¾ and 1 in. with other widths made on special order. First production deliveries will be of transparent tape, which can be applied over labels without obscuring the message. The tape will later be available in standard colors of black, white, red and blue, and other color schemes.

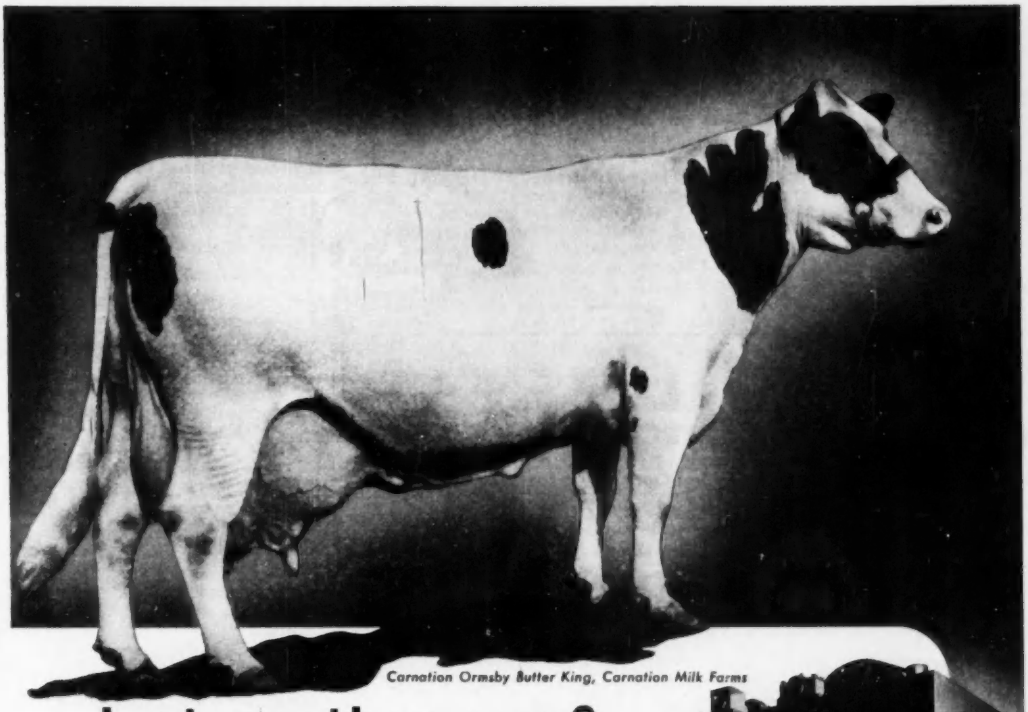
K-17—Sleeve Gage

Brown & Sharpe, Providence, R. I., offers a new service in the designing and building of special automatic and



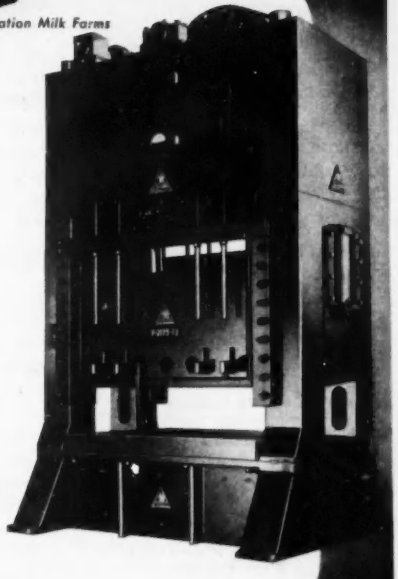
Brown & Sharpe sleeve gage, one item in company's custom-engineered electronic sorting and gaging equipment

semi-automatic inspecting and sorting equipment to meet individual needs for volume of product. They can be manual loading and disposal; manual loading and automatic disposal; automatic



Carnation Ormsby Butter King, Carnation Milk Farms

Just another cow?



She may look like any other cow, but Carnation Ormsby Butter King holds the national record for butterfat production. That's what she was specially bred to accomplish. Though different presses may appear to be much alike, too, the fact is that a Clearing press generally sets production records that bring extra income to the user, because Clearing presses are designed and built for that special purpose.

There is plenty of evidence to prove we've succeeded. When you use a Clearing press, added profits result from a smaller number of rejects, from reduced loss of operating time for die repair or readjustment, from speedier operation, from quicker and smoother assembly of the parts later.

Let us tell you about Clearing performance. A wire, letter or phone call will bring you facts and figures.

CLEARING PRESSES

THE WAY TO EFFICIENT MASS PRODUCTION

CLEARING MACHINE CORPORATION

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NEW PRODUCTS

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loading and automatic disposal. The machines are able to segregate a product into any number of categories and each category can be of any dimensional "width."

The machine illustrated gages and sorts straight sleeves, measuring for length and diameter at both ends. The sleeves are measured into four categories:

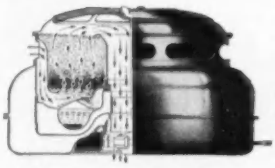
(1) Oversize and undersize in length regardless of diameter. (2) Small in diameter at either or both ends. (3) Either or both ends large in diameter. (4) Good sleeves, within tolerance.

This machine has a production rate of approximately 3000 per hr. Capacity is adjustable for different lengths and diameters. It is loaded manually, automatic disposal.

SPECIALISTS
IN AUTOMOTIVE PROTECTION AND SAFETY

Behind United Specialties Company is nearly 30 years' experience in developing automotive specialties. United manufactures products that contribute materially to improved engine performance and increased driving safety.

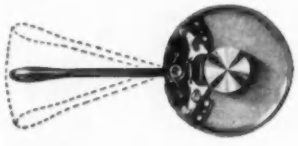
United Air Cleaner Division



Combination oil bath air cleaner and silencer used on down draft carburetors where head room is limited.

manufactures a complete line of oil bath aid cleaners for protection of engines in cars, trucks, buses, tractors, stationary and portable power units — 260 individually designed models to fit every type of internal combustion engine, including diesels. United air cleaner production has exceeded the 15,000,000 mark.

Mitchell Division



Mitchell built-in, self-cancelling turn Signal Switch. Clamp-on and screw type units are available for car, truck and bus installation.

offers the semi-automatic turn signal switch — a positive means of indicating turns for greater driving safety. With more and more states making turn signals mandatory, these units are rapidly becoming a driving "must."

MITCHELL IGNITION SWITCHES have an industry-wide reputation for dependability and long life. They have double the useful life of ordinary switches. "Radio" position reduces drain on battery when motor is not running.

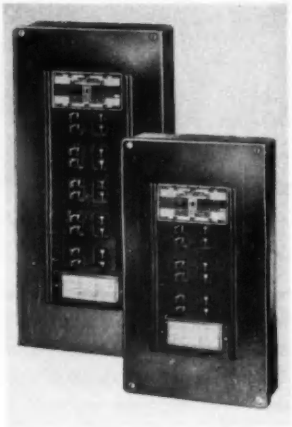
IN ADDITION Mitchell makes a complete range of rolled shapes, stamping and dovetails. Your inquiries will receive prompt attention.

UNITED SPECIALTIES COMPANY
UNITED AIR CLEANER DIVISION, CHICAGO 20 • MITCHELL DIVISION, PHILADELPHIA 20
AIR CLEANERS ★ METAL STAMPINGS ★ DOVETAILS
IGNITION AND TURN SIGNAL SWITCHES ★ ROLLED SHAPES

K-18—Plug-In Load Centers

New "Plug-In" type Multi-breaker load centers for lighting and appliance circuits announced by Square D Co., Inc., Detroit, Mich., incorporate features for conveniently adding or changing circuits as conditions require, thus minimizing wiring and installation time.

Type MO 12 gives 2, 4, 6, 8, 10 or 12 circuits, as required, when thermal-magnetic multi-breaker units are plugged on to the basic bus bar structure. The basic unit consists of a box with bus structure and one 4-circuit plug-in unit in place. Plug-in units are available in ratings of 15, 20, 30, 40 and 50 amps, 120-240 volts A.C.



Square D plug-in Multi-breaker load centers

Type MO 20 is similar to type MO 12 but has space for as many as 2 or 4 circuit units—giving 6, 8, 10, 12, 14, 16, 18 or 20 circuits as required.

All Square D Multi-breakers are of Thermal-(Coilless) Magnetic construction. The thermal element deflects in proportion to temperature of wire insulation resulting from both air and losses within the conductor. The magnetic element responds instantly to heavy overloads or shorts. Both are stated to be needed for complete protection.

Load centers are available with flush or surface type mounting covers and 3 phase 4 wire arrangement.

(*Turn to page 82, please*)

This is no idle promise. It is a proved fact, demonstrated day after day in the production of widely varied parts and products. Three tons of N-A-X HIGH-TENSILE are yielding as many finished units as were previously yielded by *four* tons of carbon sheet steel.

This "new arithmetic in steel" is helping scores of manufacturers. They are taking advantage of N-A-X HIGH-TENSILE'S greater strength and corrosion-resistance to reduce sections an average of 25%—and still provide greater strength and durability than can be obtained with thicker sections of mild-carbon steel.

At a time when America must make full use of its steel-producing capacities and conserve its natural resources, the trend to N-A-X HIGH-TENSILE has national significance. Each ton produced represents a potential 33% increase in finished goods of superior quality. Investigate the opportunity to make each ton of sheet steel go farther—through the superior quality of N-A-X HIGH-TENSILE.

GREAT LAKES STEEL CORPORATION

N-A-X ALLOY DIVISION • ECORSE • DETROIT 29, MICHIGAN • UNIT OF NATIONAL STEEL CORPORATION

NEW PRODUCTS

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(*Continued from page 80*)

K-19—All-Aluminum Tube Fitting

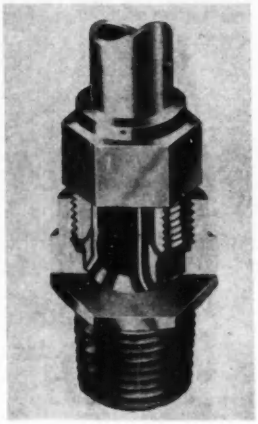
A new all-aluminum fitting for use with annealed aluminum tubing is announced by the Scovill Mfg. Co., Waterbury, Conn.

This new aluminum fitting is of the Uniflare design as used in Scovill's brass fittings. The Uniflare design is a self-contained, two-piece fitting, with a self-flaring feature. The body of the fitting contains a flaring cone, and the nut contains a thrust collar. One turn of the nut, with an ordinary wrench, is sufficient to shear off the collar, and further tightening clamps the collar onto the tube to form a seal which is said to be leakproof. The manufacturer reports tests in which the tube will burst, but not at the joint, before the fitting will leak.

Advantages pointed out by the manufacturer are, in addition to the convenience of the self-flaring feature and the leakproof seal: no danger of tube cracking during flaring and the opportunity to use standard wall tubing rather than the much heavier tubing often required to provide the extra strength. The Uniflare fitting may be disassembled and reassembled many times without impairing the tightness of the seal.

In the aluminum type, the entire fitting is anodized for corrosion resistance, and during the anodizing a blue color is added to the finish for identification purposes.

Uniflare aluminum fittings are available in all standard shapes on a made-to-order basis for use with aluminum tubing 3/16 in. through ½ in. OD.



Scovill Uniflare design all-aluminum fitting for aluminum tubing

The manufacturer points out that aluminum tubing requires aluminum fittings for positive, permanent connections. When brass fittings are used with aluminum tubing, a galvanic action occurs between the brass and the aluminum, corroding and weakening the seal.

K-20—Welding Electrode

A new improved arc-welding electrode, the W-22 (AWS Class E 6010) a reverse polarity d-c rod, has been an-

THE SAFEST DIRECTION SIGNALS

have SAFETY Pilot Lights

The safety pilot light is an exclusive feature of the TUNG-SOL Flasher and an important one wherever flashing signals are employed. In automobile applications it does more than tell that the switch is "off" or "on". It indicates when flashing that the signal system is functioning properly. Should the pilot light not respond when the switch is on, it is a warning of a failure in the circuit.

TUNG-SOL Flashers have ten years of automotive use to recommend them. They start instantly, have crisp action, consume little current and are not affected by ambient temperatures. A TUNG-SOL Flasher normally lasts for the life of the car without attention. There is a type for every application. Write for brochure.

TUNG-SOL SIGNAL FLASHERS

ALSO AUTO LAMPS, ALL-GLASS SEALED BEAM LAMPS AND ELECTRON TUBES

TUNG-SOL LAMP WORKS INC., Newark 4, N. J. • Sales Offices: Atlanta Chicago • Dallas • Denver • Detroit • Los Angeles • Newark • Philadelphia

Preventing END BEARING OF GEAR TEETH . . .

- increases their factor of safety
- reduces gear noise
- and prolongs service life

Conventional gear teeth (spur or helical) can be expected to behave as they should theoretically only on the drafting board. When they are made of steel and assembled in a power unit, it is a rare accident when bearing is uniform across the entire faces of any two mating teeth. In nearly every case bearing is concentrated at one end of the tooth or the other where it is most vulnerable to failure.

The remedy is the Elliptoid Tooth Form, engineered and produced by Red Ring engineers 12 years ago. The Elliptoid Tooth Form positively prevents end bearing as demonstrated by actual experience in hundreds of applications.

One nationally known manufacturer of trucks and tractors received frequent complaints of gear tooth failures until he adopted the Elliptoid Tooth Form. Since then such complaints have practically vanished. Elliptoid transmission gears tested by this manufacturer for 125 hours under a load of 140 foot pounds and then for an additional 125 hours at 180 foot pounds showed no harmful effects.

Another top ranking tractor manufacturer says the service life of his Elliptoid gears is 30 times greater than that of previous conventional gears. Elliptoid gears are produced on Red Ring Gear Shaving Machines.

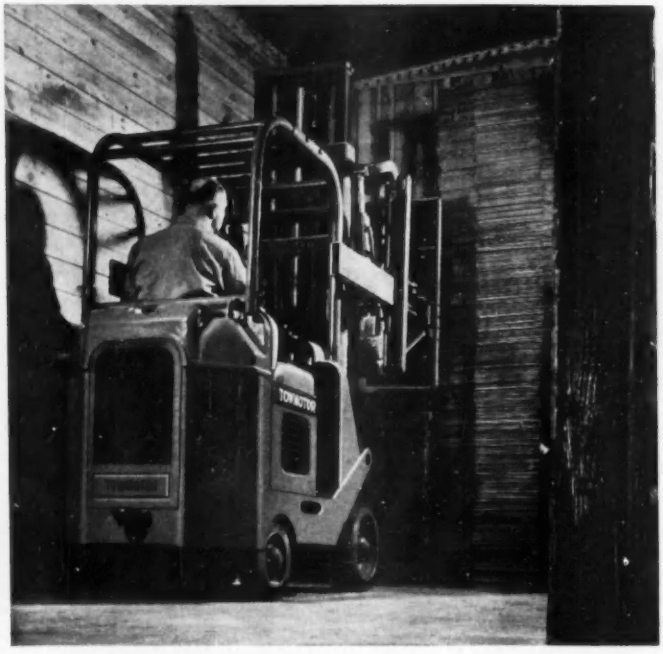
Send for descriptive literature.

SPUR AND HELICAL GEAR SPECIALISTS
ORIGINATORS OF ROTARY SHAVING AND ELLIPTOID TOOTH FORM

NATIONAL BROACH AND MACHINE CO.

5600 ST. JEAN . . . . . DETROIT 13, MICHIGAN

WORLD'S LARGEST PRODUCER OF GEAR SHAVING EQUIPMENT



AGILE and FAST...

for easy handling in tight spots!

2 SPEEDS FORWARD and REVERSE

—another Towmotor efficiency feature

A lift truck travels in reverse 50% of the time. That's why Towmotor has 2 speeds forward, 2 speeds reverse—offering fast travel in both directions.

Ask to see the New Towmotor Movie, "The One Man Gang," right in your office.

Towmotor rear wheel steering—opposite the load—provides fast and easy maneuverability under all conditions. Designed for sharp angle turns, Towmotor steering mechanism permits rapid travel in and out of box cars, highway trucks, narrow aisles and doors, cutting mass handling time and costs. Compare Towmotor with any other fork lift truck and you will see why Towmotor engineered features make every Mass Handling job easier, faster, safer. 10 models plus standard and specially designed accessories handle loads from 1500 to 15,000 lbs.—a Towmotor for every job. Write for a copy of the "Operators Guide." Towmotor Corporation, Division 45, 1226 E. 152nd St., Cleveland 10, Ohio. Representatives in all Principal Cities in U. S. and Canada.

every handling job is easier with TOWMOTOR MH!

TOWMOTOR
THE ONE-MAN-GANG

FORK LIFT TRUCKS and TRACTORS

RECEIVING • PROCESSING • STORAGE • DISTRIBUTION

NEW PRODUCTS

For additional information regarding any of these items, please use coupon on page 56

nounced by General Electric Co., Schenectady, N. Y. The W-22 electrode is designed specifically for vertical and overhead welding of all types of joints in mild steel. Its penetrating arc suits it for welding galvanized plate stock. This penetration also facilitates welding of lap joints and edge welds.

High tensile strength and ductility with good impact resistance are featured properties of the W-22 electrode welding bead. The new electrode may be used for the repair welding of castings because of its low volume slag-forming characteristics. Its stable arc is said to produce weld deposits of very smooth contour in horizontal and overhead positions without necessity of oscillation.

K-21—Bench Grinder Adapter Base

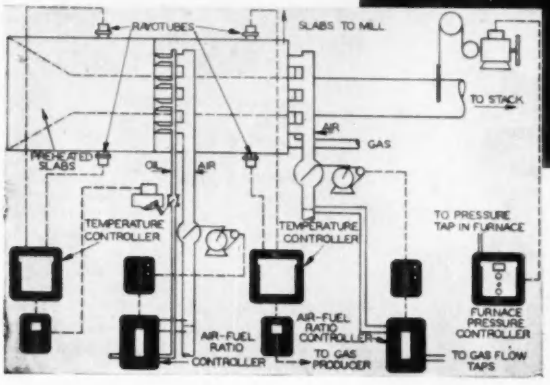
An adapter base that converts almost any bench grinder into an accurate carbide grinding machine has been developed by E. F. Hager and Son, Queens Village, N. Y. The attachment makes available the same "reciprocating action" tool holder used in the large Hager universal carbide grinder. Although the new attachment was designed principally for the grinding of carbide tools, all single point cutting tools requiring exact angles can be ground with it.

The reciprocating action produces a straight and smooth cutting edge. The continuing motion prevents overheating of the carbide during grinding. All front, side and top angles can be set exactly in both vertical and horizontal planes, and firmly locked in position.

The feed of the tool towards the grinding wheel is controlled by the

Hager adapter base for bench grinders

NEWS!
in CONTROL for FURNACES



Typical application of L&N Integrated Control is on slab-heating furnace diagrammed at left. Control panel is shown above. Producer gas is fired in the soak zone, oil in the pre-heat. To assure maximum heating with the cheaper fuel, the L&N Integrated Controls for both zones are interlocked, so that oil supplies only the supplementary heating. Net result of this flexible set-up is top fuel efficiency, and "closer control than we've ever had before".

If you haven't yet investigated L&N Integrated Control for soaking pits and other big furnaces, you may be missing a chance for important savings in operating costs. A big step forward in instrumentation, this new control now gives you all-L&N quality results in coordinating, the regulation of temperature, draft and air-fuel ratio. Integrated Control links these vital factors in a completely electric system.

More Production. Mill stoppages for temperature adjustment are virtually ended, because slabs or ingots are fed to the mill at just the right temperature for rolling. Refractories last longer; time between repair shutdowns is increased.

Fewer Rejects. Slabs or ingots have the right surface for rolling, because furnace atmosphere is held either oxidizing or reducing as required. Uniform temperature means easier rolling, freedom from cobbles, seams, etc.

Less Fuel Per Ton. Fuel is burned efficiently at all firing rates under regulation of the new L&N Air-Fuel Ratio Controller. This flexible, sensitive instrument accurately meters combustion air in proportion to gas or oil. Wasteful overheating is eliminated.

A Compact System. Immune to freezing and clogging, the L&N system moves all dampers, air inlet vanes and fuel valves by means of electric-motored drive units. The panel arrives at your plant factory-wired and tested; tailor-assembled to the individual needs of your own furnaces.

Catalog. For information on this modern way to regulate big furnaces, write for our new booklet, or better still, ask an L&N engineer to call. Address Leeds & Northrup Company, 4966 Stenton Avenue, Philadelphia 44, Pa.

MEASURING INSTRUMENTS · TELEMETERS · AUTOMATIC CONTROLS · HEAT-TREATING FURNACES

LEEDS & NORTHRUP CO.

Jrl Ad N-660(1)

NEW PRODUCTS

feed knobs, graduated in 1/1000 in. divisions. The tool holder, holding single point cutting tools up to 1¼ in. high, is mounted on an arm which swivels from one side of the wheel to the other. This permits grinding of both right and left hand tools.

The company claims that in grinding carbide on bench type grinders in conjunction with this adapter base, good results may be obtained with use of crystolon wheels. For the perfect finish required to enable carbide to perform most economically, however, use of diamond wheels is recommended wherever possible.

costs more yet saves you money

try a PARCO formulated CLEANER!

A Parco Cleaner costs you more per pound than your present metal cleaner. Yet cleaning economy—actual money savings—is reported from plant after plant, after changing to a Parco *Formulated* Cleaner.

Parco Cleaners are specially formulated to clean and condition metal surfaces for the next step in the finishing operation, to reduce cleaning time, operating temperatures and concentration of cleaner used. Surface area cleaned per pound of cleaner material is the basis of cost comparison of metal cleaning.

Try a Parco *Formulated* Cleaner. See if it doesn't save money for you, too.

• **Emulsion and Solvent Type**—Spray and immersion cleaners for removing oil, grease and soil from metal surfaces.

• **Acid Type**—Four cleaners for quick, effective removal of rust and scale from iron and steel.

• **Alkaline Type**—Light and heavy duty spray and immersion cleaners. For removal of oil, grease and soil from metal surfaces.

Bonderite, Parco, Parco Lubrite—Reg. U. S. Pat. Off.

PARKER

PARKER RUST PROOF COMPANY
2175 East Milwaukee Ave
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BONDERITE—Corrosion Resistant Paint Base • PARCO COMPOUND—Rust Resistant
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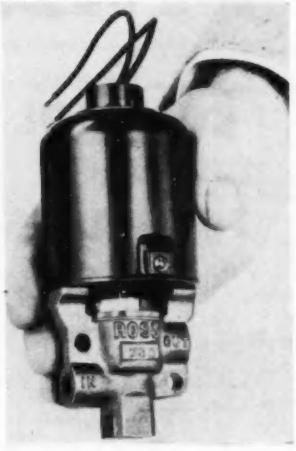
K-22—Solenoid Valve

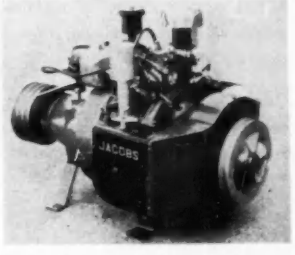


Ross ⅛ in. solenoid valve.

Presented by Ross Operating Valve Co., Detroit, Mich., is a new, compact, quick-operating air control valve, direct operated using the standard Ross solenoid.

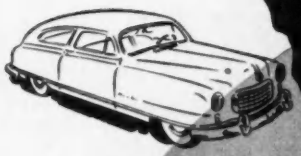
Of ⅛ in. pipe size, straightway or 3-way, with in-line, side, bottom or panel mountings, the valve is available in both normally open and normally closed models. The straightway units are suitable for the control of liquids since corrosion-resistant materials are used throughout. All parts are easily replaceable.

K-23—Industrial Engine



Introduced by Jacobs Aircraft Engine Co., Pottstown, Pa., is this lightweight industrial engine, the O-60 A, designed for use by manufacturers of agricultural implements, stationary equipment, and road and construction machinery, etc. Engine is 2 cyl horizontally opposed, air cooled, 15-20 hp of 60 cu in. displacement. Bore is 3.5 in., stroke 3.0 in., weight 150 lbs, length 25 in., width 19 in., and height 18 in. Aluminum alloy construction is featured.

(*Turn to page 88, please*)



Expansive but not Expensive

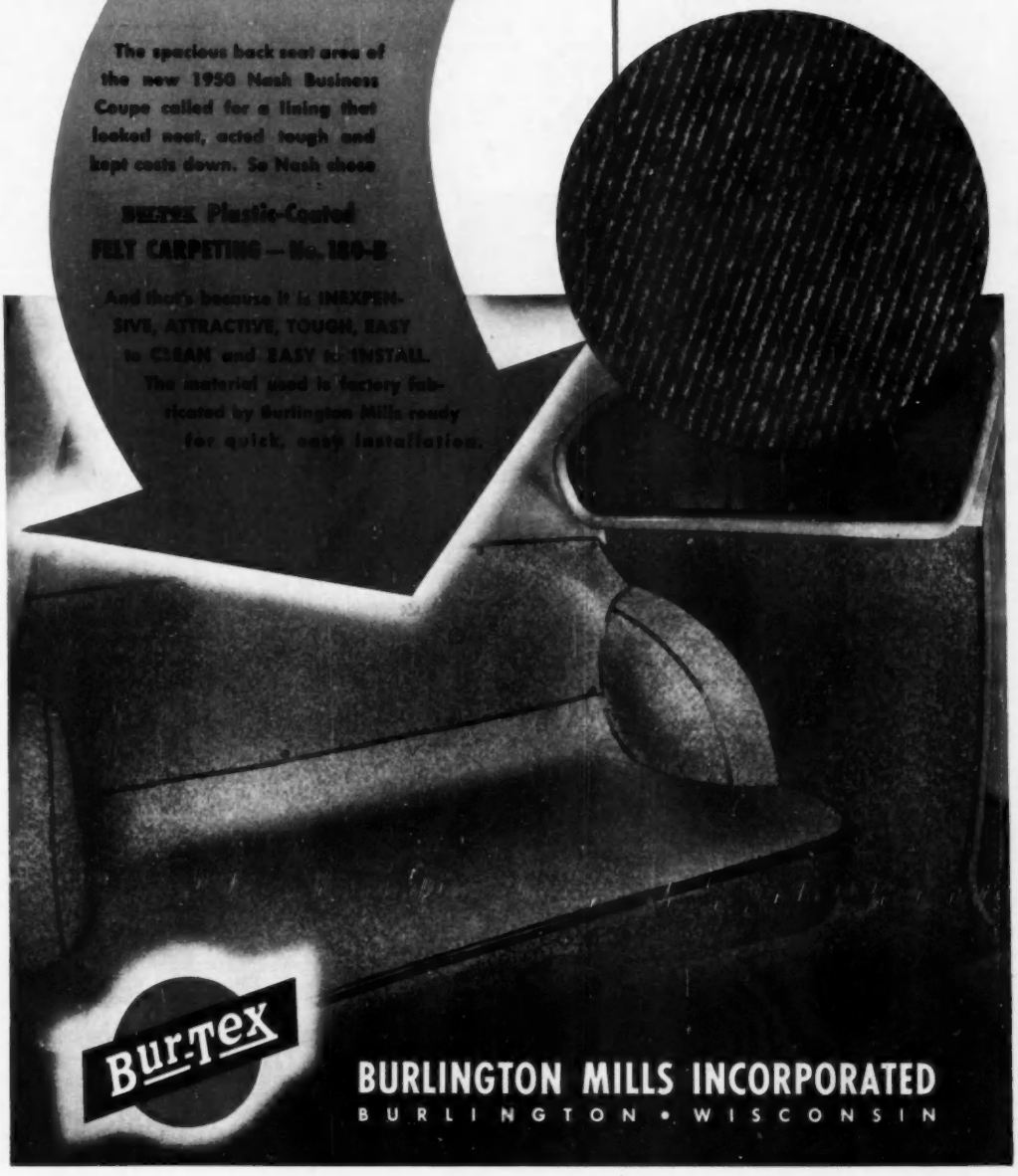
Nash chooses Bur-Tex

The spacious back seat area of the new 1950 Nash Business Coupe called for a lining that looked neat, acted tough and kept costs down. So Nash chose

Bur-Tex Plastic-Coated FELT CARPETING — No. 180-B

And that's because it is INEXPENSIVE, ATTRACTIVE, TOUGH, EASY to CLEAN and EASY to INSTALL. The material used is factory fabricated by Burlington Mills ready for quick, easy installation.

Note the stylish rib effect of real carpeting. Available in many combinations of colors to suit your requirements.



Bur-Tex

BURLINGTON MILLS INCORPORATED

BURLINGTON • WISCONSIN

NEW PRODUCTS

For additional information please use coupon on page 56

(*Continued from page 86*)

Alkaline storage battery, the Yardney Silvercel

K-24—Battery With Silver Cell

Initial commercial tests made by Yardney International Corp., New York, N. Y., are declared to have proved that the first industrially effective silver cell storage battery now being manufactured by them on a pilot basis is successful. Introduction of this new type battery is said to mark perfection of an alkaline storage battery utilizing silver and zinc as active materials.

Specifically, the Silvercel is only 1/3 to 1/5 the weight of commonly known batteries now in use. In bulk, the volume of the Silvercel is only ½ to 1/3 that required by batteries commonly used. The amp-hr efficiency of the Silvercel approaches 100 percent, and the energy efficiency 85 percent. In addition to savings in weight and space, the Yardney Silvercel exhibits great resistance to mechanical shock since there are no plates or separators to be damaged, and shock resistance is limited only by the strength of the case, which can be selected to meet any variety of requirements, the company points out.

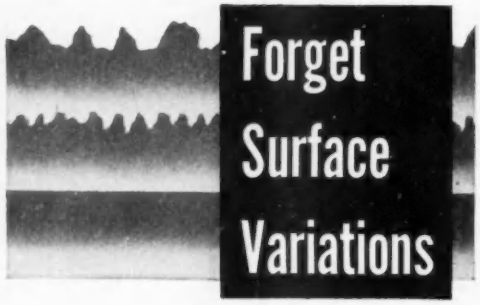
Construction of the entire battery completely eliminates hazards of leakage and spilling. The Yardney cell can withstand heavy discharge without any damage in common with most alkaline batteries, and noticeably absent during the charging cycles or discharging cycles are corrosive and poisonous fumes.

Immediately available are five types of Silvercel batteries ranging from 0.5 to 40 amp-hr capacity.

K-25—Plastic Coated Upholstery Fabric

Made in 14 solid decorator's colors by United States Rubber Co., New York, N. Y., a new smooth surface plastic coated upholstery fabric known as Royal Grain Naugahyde is designed for interior trim in automobile and other vehicles, among other uses.

Colors include black, bone white, burgundy, soft yellow, bright scarlet, deep crimson, warm gray, London tan, gray green, horizon blue, turquoise, chartreuse, coral and kelly green. The smooth skin-like finish can be cleaned with soap and water, is flexible and easy to tailor around curves, corners and edges, and has high resistance to edge-wear, scuffing, flexing and wrinkling. It is not affected by perspiration, alcohol, oils, grease, acids and alkalis, according to the company.



MERZ NEW-MATICS ACCURATELY MEASURE I.D. OR O.D. . . . REGARDLESS OF SURFACE CONDITIONS

● Only MERZ *New-Matic* Measuring Machines enable you to obtain identical I.D. or O.D. readings—*every time*—on parts of like diameter . . . *regardless of surface variations.* In MERZ *New-Matics*, a synthetic ruby button contacts only the highest surface points. Unlike conventional gages—where compressed air directly touches *all* surfaces, high and low alike—MERZ *New-Matics* are unaffected by any surface variations.

For the same reason, MERZ *New-Matics* are the only air-actuated units capable of accurately gaging parts in which perforations or keyways have been machined. MERZ *New-Matic* Measuring Machines also permit accurate gaging to the extreme edges.

For full details on these and many other advantages of MERZ inspection equipment, write for free 20-page book on the *New-Matic* principle of measuring and sorting.

MERZ ENGINEERING COMPANY • INDIANAPOLIS 7, IND.

MERZ "Master" *New-Matic* Measuring Machine. Other *New-Matic* models for every inspection purpose.

MERZ

A PRODUCT OF
BORG-WARNER

BW

ABLE DESIGN
MEANS DEPENDABLE
PERFORMANCE . . .

True test of any design is its ability to *perform*, when translated into production units.

Since 1903, Long radiators . . . and since 1922, Long clutches . . . have equipped millions of passenger cars, trucks, tractors and buses. They have given billions of miles of fine performance . . . proof of able design and careful manufacturing.

LONG

CLUTCHES • RADIATORS • OIL COOLERS

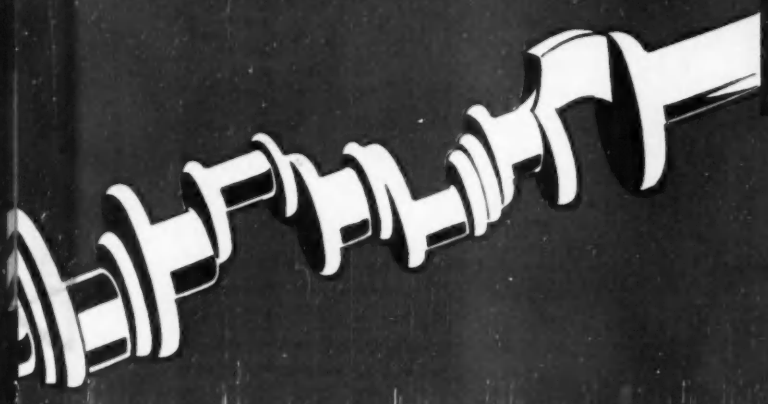
LONG MANUFACTURING DIVISION
BORG-WARNER CORPORATION
DETROIT 12, and WINDSOR, ONTARIO

from torque to tobacco...

via

RM

FIRST IN FRICTION



Tobacco growers, wheat growers, corn growers . . . farmers of every kind . . . applaud the newest development in farm mechanization: ***the tractor with a torque-convertor.*** As you might expect, R/M has played a big part in perfecting this new use of a new principle in clutches. Here's still another reason why industry looks to R/M, the world's largest producer of friction materials, for practical solutions to problems in brake linings and clutch facings!

RAYBESTOS-MANHATTAN, INC.

EQUIPMENT SALES DIVISION **620 Fisher Bldg., Detroit 2, Mich.**

445 Lake Shore Drive, Chicago 11, Ill.
4651 Pacific Blvd., Los Angeles 11, Calif.
1071 Union Commerce Bldg., Cleveland 14, Ohio

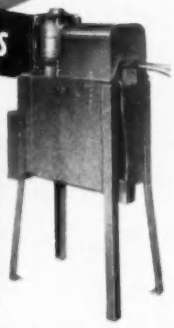
Factories: Bridgeport, Conn. Manheim, Pa. Passaic, N.J. No. Charleston, S.C.

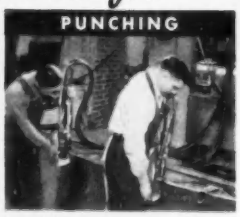
RAYBESTOS-MANHATTAN, INC., Manufacturers of Brake Linings • Brake Blocks • Clutch Facings Fan Belts • Radiator Hose • Mechanical Rubber Products • Rubber Covered Equipment • Packings Asbestos Textiles • Powdered Metal Products • Abrasive and Diamond Wheels • Bowling Balls

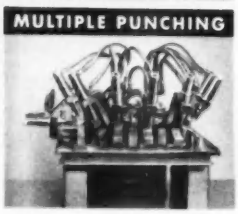
"Hy-Power" HYDRAULICS

"HY-POWER" HYDRAULICS, developed by Hannifin, has brought forth an entirely new concept of the high speeds and extreme forces that can be developed hydraulically with small, compact, automatic work units. Based on the use of 5,000 p.s.i. pressure through an ingenious mechanical cycle control unit, "HY-POWER" HYDRAULICS has gone far beyond its original application in the famed Hannifin "Hy-Power" Hydraulic Riveter. Today, hundreds of production engineers and tool designers are using "HY-POWER" HYDRAULICS as the key to faster, better production and lower costs for an almost unlimited range of applications. You, too, can benefit from this truly noteworthy development. Ask for the story of "HY-POWER" HYDRAULICS—it's contained in new bulletin just off the press!

HYDRAULIC PRESSURE GENERATORS *plus* TOOLS, CYLINDERS, AND MACHINES *for*







HANNIFIN supplies everything you need to make "HY-POWER" HYDRAULICS work efficiently and dependably for you.

HYDRAULIC PRESSURE GENERATORS—The heart of the "Hy-Power" System! Up to 5,000 p.s.i. pressure at your finger-tip under exclusive automatic control. Occupies less than 6 sq. ft. of floor space, yet is capable of delivering hundreds of tons of useful force. 22 standard models.

"HY-POWER" HYDRAULIC CYLINDERS—Built to work at various pressures up to 5,000 p.s.i. pressure. Heat treated alloy steel bodies with precision ground bore. Alloy steel rod, case hardened and ground. 9 standard sizes, 2" to 7¼" bore.

Send for a copy of this Bulletin

● **It tells the complete story of "HY-POWER" HYDRAULICS. 28 pages of equipment, application, and engineering data. Ask for Bulletin 150.**

COMPLETE MACHINES—"Hy-Power" work units are easy to apply and use in machines of your own design or construction. Hannifin also offers a complete line of standard and specially made portable and stationary Riveters, Punches, Presses, Multiple Riveting Machines, and Multiple Punching Machines.

HANNIFIN CORPORATION

1143 S. Kilbourn Ave. Chicago 24, Illinois

AIR CYLINDERS • HYDRAULIC CYLINDERS • HYDRAULIC PRESSES
PNEUMATIC PRESSES • HYDRAULIC RIVETERS • AIR CONTROL VALVES

1950 Cadillacs Feature New Bodies

(*Continued from page* 43)

idle ports, and thus serves to eliminate engine stalling during warm up in cold, humid weather.

Because of the lowered hood line, the air cleaner is mounted lower and the new carburetor reduced in height to provide clearance. Carburetor calibration has been improved to provide better fuel economy at low speeds. The fuel and vacuum pump unit has larger valves to eliminate vapor lock and assure fuel delivery under hot operating conditions. In addition, windshield wiper operation is improved by the increased vacuum.

Piston pins are assembled with a press fit in the connecting rods to eliminate wear at this point and to promote noise-free operation. Piston pin bearing length in the piston has been increased to further reduce wear. The water pump impeller is made of plastic, and contour and dimensional control of the blading have been improved.

Several changes have been effected in the valve gear mechanism—camshaft, push rods, rocker arms and brackets—to reduce valve gear noise and increase life. New type valve guides provide better valve stem lubrication.

Engine mounting cushions now are located directly on the frame and are made of a new rubber compound to improve smoothness. A new harmonic balancer having the mass supported through rubber compound is said to improve balancer control and increase the life of the unit.

Some changes in the gas lines and new routing of lines are designed to reduce restrictions in fuel supply.

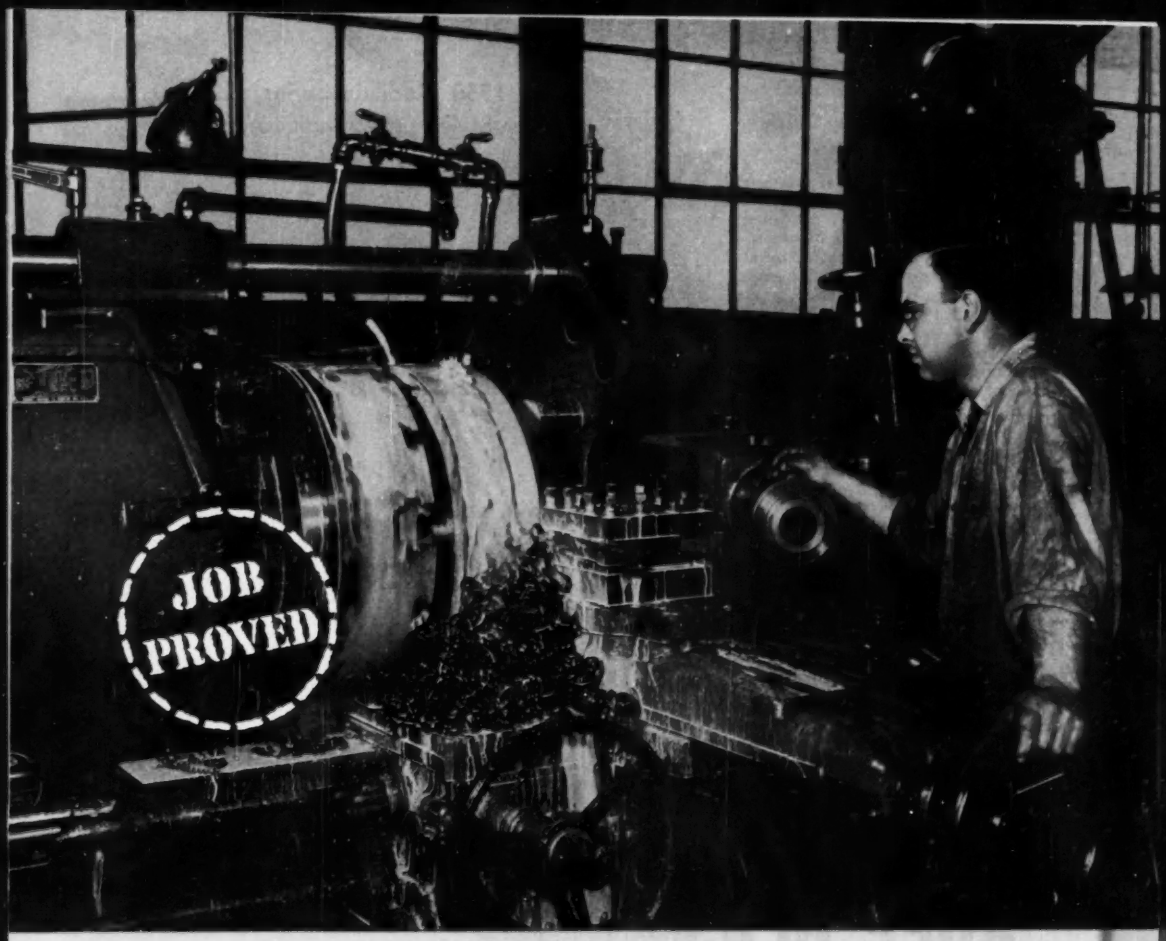
A new oval type muffler not only improves silencing but conserves space and permits the body to be mounted lower. The outer shell is of sandwich construction consisting of two layers of metal and a layer of heavy asbestos to lower noise level and reduce floor temperature.

The engine cooling system thermostat has been changed to provide quicker warm-up. The current-voltage regulator has been made more quiet. A high capacity starter switch has been adopted, providing simplification by eliminating the starter relay.

With the relocation of the fuel tank by mounting it directly to the body, the fuel gage has been moved to the front of the tank to permit its removal without dropping the tank.

While the basic design of rear axles remains unchanged, the center line of the differential has been moved to the left by 1⅛ in., thus placing the drive shaft on the chassis centerline in the plan view. This has the effect of reduc-

(*Turn to page* 94, *please*)



S.E.C.O. BEATS COSTLIER CUTTING OIL

Competitive Product Fails to Match Fine Record of Sunoco Emulsifying Cutting Oil in Cost or Performance

For 27 years a metalworking shop used Sunoco Emulsifying Cutting Oil with complete satisfaction on difficult operations. The following is a typical example:

Machine: Gisholt turret lathe, model 4L.
Part: 20" press mold shell 22⅛" O.D. x 6" wide x 20½" I.D.
Operation: Turning, boring rough forgings.
Material: 40-50 carbon steel.
Tools: Firthite carbide tools.
Feed: .012 at 31 rpm.
Cuts: ⅛" to ¾" on O.D. and boring.

Tool life was excellent. Machines stayed clean. High production, with minimum scrap, was the rule year in and year out.

Two years ago the shop was persuaded to try a competitive oil on the above operation. Test results showed that the competitive oil, costing three times as much, lacked stability. Performance was far inferior to that of Sunoco Emulsifying Cutting Oil in regard to tool life and quality of finish. The company was quickly convinced that its original choice had been sound.

In all machine shop operations, on both ferrous and nonferrous metals, you'll find Sunoco Emulsifying Cutting Oil and Sunicut* straight cutting oils of real assistance. They help maintain production schedules, lengthen tool life, and keep operating costs down. For a free Sun cutting oil recommendation card, write Dept. AA1.

*Sunicut is a trademark of Sun Oil Company

SUN OIL COMPANY · *Philadelphia 3, Pa.*
In Canada: Sun Oil Company, Ltd.
Toronto and Montreal

SUN PETROLEUM PRODUCTS
"JOB PROVED" IN EVERY INDUSTRY

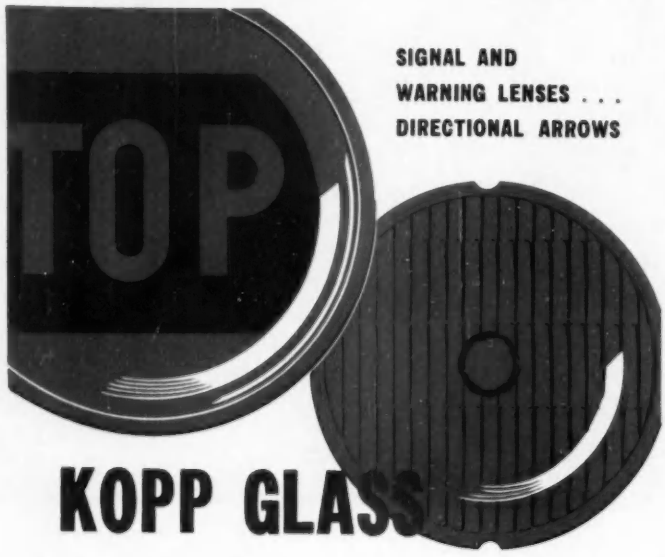
SUNOCO

ing universal joint angularity and the resulting reaction forces. The new universal joints introduced late in 1949 serve as an aid in smoothing drive line operation. On all 61, 62, and 60S cars the sliding joint is located at the rear of the transmission. On Series 75 and the 86 commercial chassis a two-piece propeller shaft with intermediate support is used, the sliding yoke being at the rear of the propeller shaft assembly. On these models a special yoke with a threaded plug is used in combination with a snap ring on the transmission shaft to lock the yoke at the rear of the transmission.

Rear axle ratio combinations for 1950 are as follows: Series 61, 62, 60S with Hydra-Matic transmission—3.36 to 1; Series 75 and 86 (commercial) with conventional transmission—4.27 to 1, with Hydra-Matic—3.77 to 1.

1950 Cadillac Series Body Styles and Specifications

Series	Body	Wheelbase (in.)	Overall Length (in.)	Overall Height (in.)	Curb Weight (lb) (Est.)
61	5-Coupe	122	211 7/8	60 15/16	....
	5-Sedan		211 7/8	62	3918
62	5-Coupe	126	220 7/8	60 15/16	....
	5-Sedan		215 7/8	62 1/16	4107
	Convertible		220 7/8	61 1/8	....
	Coupe De Ville		220 7/8	60 15/16	....
60S	5-Sedan	130	224 7/8	62 1/16	4302
75	7-Touring Sedan	146 3/4	236 5/8	64 1/16	4665
	7-Imperial Sedan		236 5/8	64 1/16	4687



SIGNAL AND
WARNING LENSES . . .
DIRECTIONAL ARROWS

KOPP GLASS

Your best choice
when QUALITY is important

As the element in the vehicle signal system through which the signal is flashed, the lens must be of highest quality if the system is to function dependably. Kopp glass lenses have every characteristic you want. They are correctly engineered and made, and are accurate in color, size and design. They are non-fading, durable and have high-transmission properties.

Maintain high-quality throughout every component part of your vehicles by specifying Kopp Glass signal lenses, warning lenses and directional arrows. They may be secured from leading makers of vehicle signal equipment.

KOPP GLASS, INC.
SWISSVALE, PA.

KOPP GLASS

Steering quality has been improved by a reduction of wheel kick. Three detail changes have been effected to reduce wheel "kick" when crossing tracks or traversing rough roads. These include — an improvement in drag link springs, greater flexibility of the steering column, and a bigger steel core in the steering wheel to increase its inertia. High speed steering has been improved by changing the percentage of car weight on the front wheels.

The Hydra-Matic for 1950 incorporates a total of 16 refinements to improve performance and durability, and to simplify servicing. Among the major changes for Cadillac are the following:

1—Modulated oil pressure to provide smoother shifting, particularly at light throttle. Oil pressure is made to vary in accordance with throttle opening so as to give a better compromise between smooth shifts and adequate power to control hydraulic action under high torque conditions.

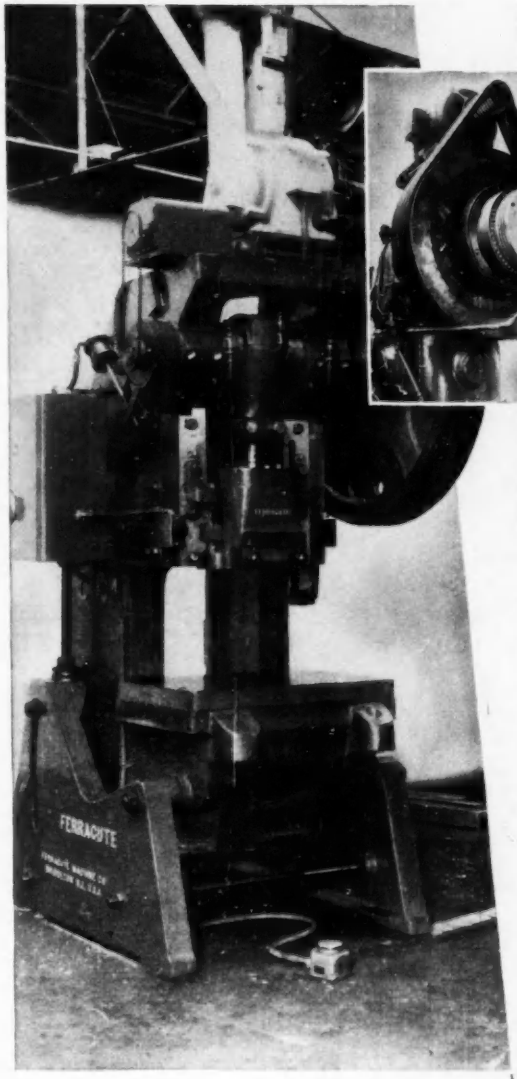
2—The valve body has been revised to give new shifting characteristics at high speed and to prevent the possibility of downshifts at speeds above normal.

3—Increased capacity in the front serves to promote smoother shifts.

4—The oil delivery sleeve has been increased in length to provide greater bearing area and longer life.

The new 8.00-15 tires, standard equipment on 60S, 61, and 62 Series, are considered more stable at higher speeds. The Series 75 is fitted with 8.20-15, six-ply tires mounted on new 15-in. wheels. Wheel disks are of the same general design but are now made of stainless steel with a chrome finish to reduce rusting. Spare tires are carried in vertical position in all body styles to provide more usable trunk space.

Back-up lights have been improved through the use of larger lamps and 32-cp bulbs. The switch now is made a part of the Hydra-Matic neutral switch.



Ferracute 75-ton Punch Press equipped with Twin Disc Model P Air-actuated Clutch.

Close-up of Model P Clutch installed on Ferracute Punch Press.

100% Faster Punch

Obtained from Twin Disc Model P Air-actuated Clutch

The problem was how to increase the short-stroke speed on a punch press. The Ferracute Machine Co., Bridgeport, N. J., called in Twin Disc engineers . . . who recommended Twin Disc Air-actuated Clutches. The result . . . *100% faster punch*. Now their complete line of 40 to 110 ton presses uses Twin Disc Air-actuated Clutches.

Twin Disc Models P and PH Air-actuated Clutches—standard on many types of heavy industrial equipment—offer advantages in any application where remote control operation is desired. Less shaft space is needed, permitting closer shaft bearing center distances. They have ideal operating characteristics: high torque capacity . . . fast or slow engagements . . . the ability to absorb heat . . . automatic adjustment for longer wear-life.

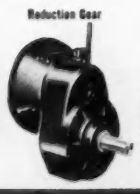
Simple in design, rugged in construction, Twin Disc Model P and PH Air-actuated Clutches are built in a wide range of sizes (14 to 42 inches) and capacities (75 to 1325 hp), permitting the selection of exactly the right clutch for every installation. Write for Bulletin 139-B. TWIN DISC CLUTCH COMPANY, Racine, Wisconsin (Hydraulic Division, Rockford, Illinois).

Heavy Duty Clutch

Hydraulic Torque Converter

Machine Tool Clutch

TWIN DISC
CLUTCHES AND HYDRAULIC DRIVES


Reduction Gear

Marine Gear

SPECIALISTS IN INDUSTRIAL CLUTCHES SINCE 1918

MEN in the NEWS

(*Continued from page 25*)

Allied Products Corp.—The appointment of **Frank H. Bishop** as Assistant to the President, **Ralph Hubbart**, has been announced.

Climax Molybdenum Co.—**Alvin J. Herzig** has been elected President of the company.

Schlegel Mfg. Co.—**Harold L. Miller**, production manager for the company, has been named General Manager of the Canadian plant at Oakville, Ontario. He succeeds **Roy Caryl. Norman J. Gibaud** will succeed Mr. Miller as Production Manager at the Rochester plants.

Hydraulic Equipment Co.—The election of **Ernest A. Berglund** as Vice-President, has been announced.

Tube Reducing Corp.—**L. A. Karg** has been appointed Sales Manager. He formerly was connected with Timken Roller Bearing Co.

Joy Mfg. Co.—The appointment of **R. G. Gehlsen** as Sales Manager, Mines Equipment Div., has been announced. **H. B. Zeppenfeld** has been made Manager, Industrial Sales, Mines Equipment Div.

Worthington Pump and Machinery Corp.—Announcement of the appointment of **K. W. Horsman** as Works Manager, Dunellen Plant, has been made. He succeeds **B. R. McBath**, resigned.

American Wheelabrator & Equipment Corp.—**R. T. Pring** has been appointed Technical Director of the Dust and Fume Div.

Fedders-McQuigan Corp. — The appointment of **Anthony J. DeFino** as General Manager of the Buffalo Division has been announced.

Gulf Oil Corp.—**Charles R. Noll** has been appointed director of Automotive Products Engineering in the newly-formed Product Development and Product Engineering section of the company.

Ethyl Corp.—The election of **Joseph A. Costello** as Vice-President has been announced.

Oronite Chemical Co. (Standard Oil subsidiary)—**H. E. Bramston-Cook** has been appointed Vice-President.

Minneapolis-Honeywell Regulator Co. —**Herbert D. Bissell** has been appointed Executive in charge of Advertising, Sales Promotion and Merchandising Depts.

The Cooper Alloy Foundry Co.—The appointment of **Herbert J. Cooper** as Asst. to the General Manager, has been announced.

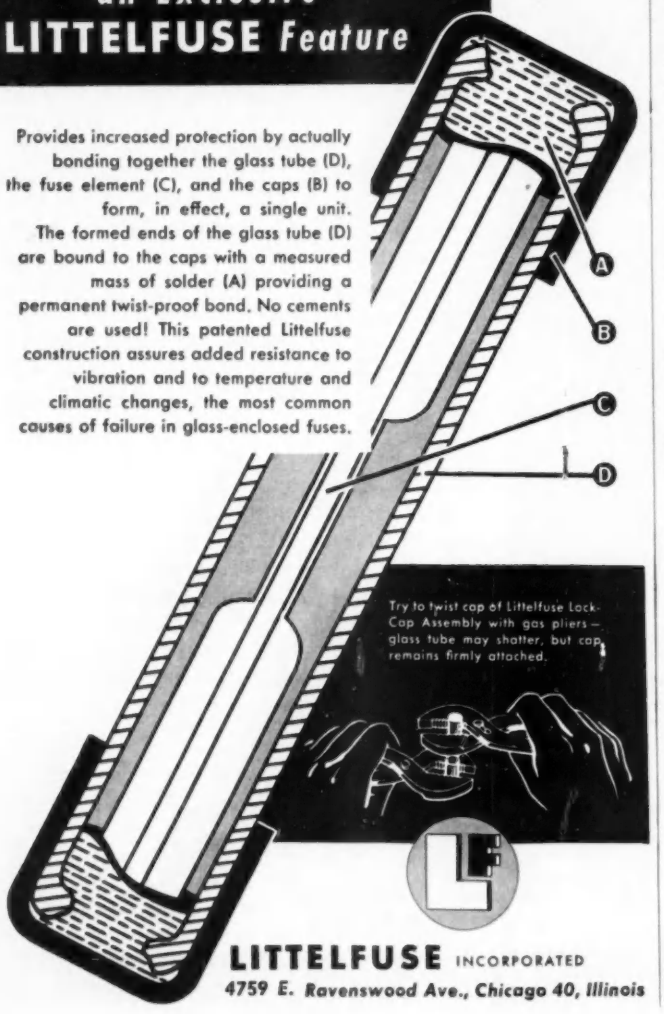
American Metal Products Co.—**F. S. Laurie** and **R. J. Williams** have been named Vice-Presidents.

Sun Oil Co.—**William D. Mason**, Director in charge of Industrial Relations, has retired.

American Oil Co.—The elections of **J. J. Leu** as Vice-President of Services and Operations Dept. and of **Marc I. Schwartz** as Vice-President in charge of Sales Dept., were announced.

THE LOCK-CAP ASSEMBLY
an Exclusive
LITTELFUSE *Feature*

Provides increased protection by actually bonding together the glass tube (D), the fuse element (C), and the caps (B) to form, in effect, a single unit. The formed ends of the glass tube (D) are bound to the caps with a measured mass of solder (A) providing a permanent twist-proof bond. No cements are used! This patented Littelfuse construction assures added resistance to vibration and to temperature and climatic changes, the most common causes of failure in glass-enclosed fuses.


A
B
C
D
Try to twist cap of Littelfuse Lock-Cap Assembly with gas pliers — glass tube may shatter, but cap remains firmly attached.

LITTELFUSE INCORPORATED
4759 E. Ravenswood Ave., Chicago 40, Illinois

AUTOMOTIVE INDUSTRIES
an up-to-the-minute publication for up-to-the-minute readers

Manufacturers like these specify FRAM

These leading manufacturers use filters embodying the Fram Oil Filtration Principle on some or all of their engines as standard equipment . . .

Allis-Chalmers Mfg. Co.
American LaFrance Foamite Corp.
B. F. Avery & Sons Company
Brockway Motor Company
Buda Company
Continental Motors Corp.
Clark Equipment Company
Crosley Motors, Inc.
Cooper-Bessemer Co.
Chicago Pneumatic Co.
Continental Aviation & Engineering Corp.
Dearborn Motors Corp.
DeLaval Separator Co.
Detroit Tractor Co.
Diamond T Motor Car Co.
Divco Corp.
Euclid Road Machinery Co.
Fate-Root-Heath Co.
Federal Machine & Welder Div.
Harry Ferguson, Inc.
Ford Motor Co.
Four Wheel Drive Co.
General Motors Truck & Coach Div.
Hercules Motors Corp.
Hill Diesel Engine Co.
Hobart Bros. Co.
Frank G. Hough Co.
Hudson Motor Car Co.
Hyster Company
Insley Mfg. Co.
International Diesel Electric Co.
Kaiser-Frazer Corp.
Kermath Mfg. Co.
Landis Tool Co.
Lathrop Engine Works
Leader Tractor Co.
Lincoln Electric Co.
Lincoln-Mercury Div. of Ford
Mack Mfg. Co.
McKay Machine Co.
Meriam Instrument Co.
National Supply Co.
Nordberg Mfg. Co.
Oliver Corp.
D. W. Onan & Sons
Owens Yacht Co.
Potter & Johnston Machine Co.
Reo Motors
Schramm, Inc.
Scripps Motors, Inc.
Seagrave Corp.
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Star Marine Engine Works
Studebaker Corp.
Tropic-Aire, Inc.
Universal Motors Corp.
Waukesha Motor Co.
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Witte Engine Works

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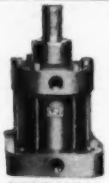


HYDRAULIC CYLINDERS
Send for catalog H-47

AIR CYLINDERS
Send for catalog 43

CLINCHORS
Send for catalog 847

AIR CONTROLS
Send for catalog 645

CUTTERS
Send for catalog 148

RIVITORS
Send for catalog 646 and 847

Business in Brief

Written by the Guaranty Trust Co., New York, Exclusively for AUTOMOTIVE INDUSTRIES.

General business activity declined slightly during the week ended Dec. 24. Department store sales, electric power production, railway freight loadings, crude oil output, and construction were lower than in the preceding week, while bituminous coal production advanced. The *New York Times* index of activity for the week ended Dec. 24 stands at 150.2, as compared with 151.5 in the preceding week and 152.9 a year earlier.

Sales of department stores during the week ended Dec. 24, as reported by the Federal Reserve Board, equaled 539 per cent of the 1935-39 average, as compared with 582 in the week before. Sales were 14 per cent above the corresponding distribution in 1948, as against a preceding increase of one per cent. The total in 1949 so far reported is five per cent less than the comparable sum in 1948.

Electric power production declined during the week ended Dec. 24. The output was 8.8 per cent above the corresponding amount in 1948, as compared with an advance of 3.6 per cent shown for the preceding week.

Railway freight loadings during the same period totaled 623,303 cars, 2.6 per cent less than the figure for the week before but 2.4 per cent above the corresponding number recorded in 1948.

Crude oil production in the week ended Dec. 24 averaged 4,995,450 barrels daily, 4700 less than in the preceding week and 697,700 under the comparable output a year earlier.

Production of bituminous coal and lignite during the same week is estimated at 9,040,000 net tons, 325,000 more than the output in the week before but 739,000 below the corresponding quantity in 1948.

Civil engineering construction volume reported for the week ended Dec. 29, according to *Engineering News-Record*, was $66,858,000, or 57 per cent less than the preceding weekly figure and 14 per cent below the comparable sum in 1948. The total recorded for 52 weeks of this year was 15 per cent more than the corresponding amount in 1948. Private construction for the period was 10 per cent above that a year earlier, and public construction increased by 20 per cent.

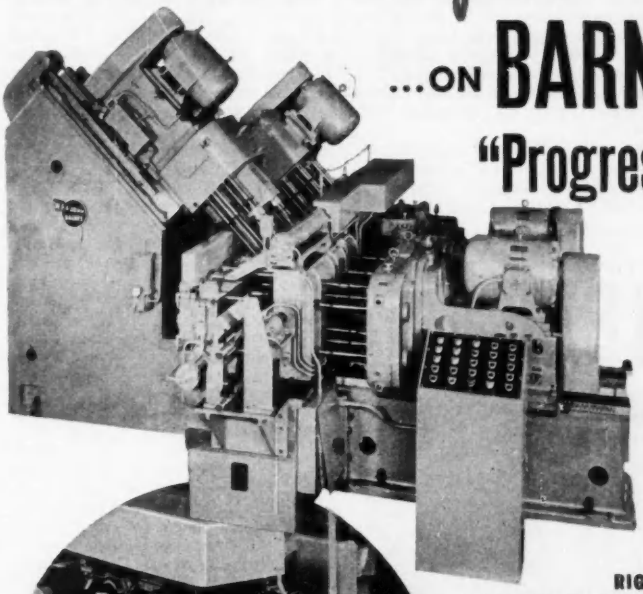
The wholesale price index of the Bureau of Labor Statistics during the week ended Dec. 27, at 154.1 per cent of the 1926 average, showed no variation from the preceding week, but was 6.7 per cent below the corresponding figure in 1948. Prices of farm products, fuel and lighting materials, and building materials increased slightly, while declines were registered in metals and metal products and chemicals and allied products.

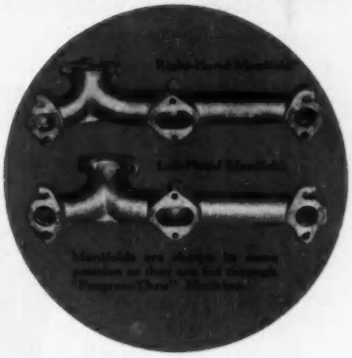
Member bank reserve balances decreased $38 million during the week ended Dec. 28. Underlying changes thus reflected include a decline of $129 million in Reserve bank credit and increases of $5 million in Treasury cash and $16 million in non-member deposits and other Federal Reserve accounts, accompanied by decreases of $68 million in money in circulation and $40 million in Treasury deposits with Federal Reserve banks.

Total loans and investments of reporting member banks declined $185 million during the week ended Dec. 21. A decrease of $16 million in commercial, industrial and agricultural loans was recorded. The sum of these business loans, $13,866 million shows a net decrease of $1766 million in 12 months.

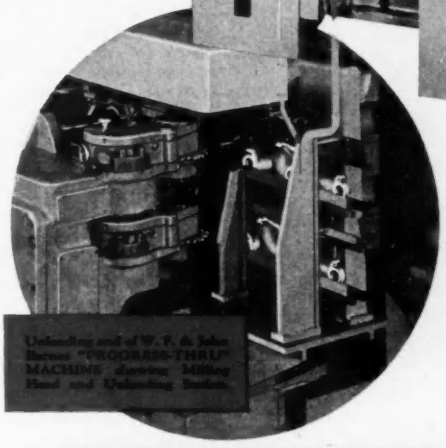
HOW *Exhaust Manifolds* ARE MACHINED AUTOMATICALLY

...ON BARNES 6-STATION "Progress-Thru" Machine





Manifolds are shown in same position as they are fed through "Progress-Thru" Machine.



Unloading end of W. F. & John Barnes "PROGRESS-THRU" MACHINE showing Milling Head and Unloading Station.

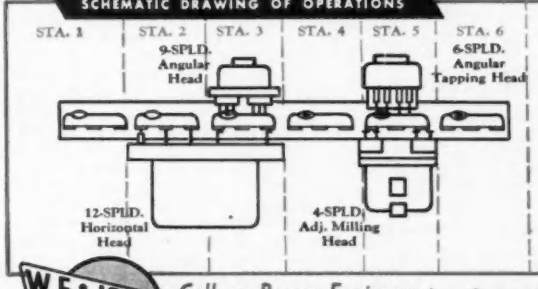
RIGHT-HAND AND LEFT-HAND PIECES MACHINED SIMULTANEOUSLY AT RATE OF 116 PER HOUR

On this Barnes Special 6-Station Automatic "Progress-Thru" Machine, both right- and left-hand automobile exhaust manifolds are drilled, bored, reamed, tapped, and milled simultaneously. Workpieces are loaded, clamped, and transferred through the machining stations in pairs, one above the other. Gross production is 116 pieces per hour on a cycle time of 1.03 minutes. A total of 36 machining operations are performed—17 in the upper right-hand manifold and 19 in the lower left-hand manifold.

CONSERVES FLOOR SPACE, REDUCES WORK HANDLING

The manifolds are received with bosses machined parallel which provide a flat surface for accurate clamping. Plug-type locators in cored exhaust holes and dowel pin locators in reamed flange holes, maintain precise alignment for accurate machining. Loading and unloading is done during the machining cycle. Thus, by combining operations in one machine, floor space is conserved, and work handling is substantially reduced.

SCHEMATIC DRAWING OF OPERATIONS



STATION UNIT OPERATION

STATION 1—Load.

STATION 2—Drill (4) $^{13}/_{32}$" dia. in center bosses. Comb. drill and ream (4) .500" dia. in end flanges.

STATION 3—Bore (2) $1^{15}/_{16}$" dia., drill for (6) $^{3}/_{8}$"—16 tap, drill $^{11}/_{64}$" and .180" dia. (1) in top angular ports (L. H. Head).
Bore (4) $1^{3}/_{8}$" dia. in end exhaust holes (R. H. Head).

STATION 4—Idle.

STATION 5—Tap (6) $^{3}/_{8}$"-16 in angular flanges (L. H. Head). Mill (4) slots in end flanges (R. H. Head).

STATION 6—Unload.

W. F. & JOHN BARNES

Call on Barnes Engineers for a free analysis of your machining problems. Find out how these or other Barnes engineered machines can be applied to help you speed production and cut costs.

W. F. and JOHN BARNES

312 SOUTH WATER STREET • ROCKFORD, ILLINOIS, U.S.A.

1950 in the Tractor Industry

(*Continued from page 35*)

mover for agriculture. A similar development was shown last month at a private demonstration and is expected to be announced shortly. Several additional Diesels will be ready for test next season.

Another development of 1949 was the widespread application of hydraulic controls, which replace manual power in raising and lowering the working parts of field implements and in comparable operations with other tractor-powered machines. This development was made possible by the approval of industry standards early in the year which apply to tractors of 35 drawbar hp and less. Standards for use with larger tractors are now in process of formulation, and are of particular interest to the Pacific Coast areas where the larger tractor and equipment units predominate.

The industry's tractor output for the first six months of 1949 exceeded that of any previous half-year. Operations declined nominally during the third quarter to lower the nine-month record below that of 1948. The steel strike together with labor stoppage in one of the industry's largest plants resulted in a more serious production loss during the final three months.

The production outlook for 1950 is considerably improved as compared with the second half of 1949. Material deliveries are now being stepped up, component parts are becoming more plentiful and the labor outlook is much brighter. The industry expects to recover most of its lost production during the first quarter, although it may not be able to supply entirely the early demand for all items from the Deep South where farm work starts within a few weeks. The shortage of steel sheets, however, still prevails and may curtail production of combines, pick-up balers, cotton harvesters, forage harvesters and other major equipment units. A considerable dent was made in the stockpile which normally would have been available to the industry by the allocation of sheets made by the USDA for grain storage bins.

Despite an approximate 10 per cent decline in farm commodity prices during 1949, a trend which will continue into 1950, farmers are still in strong financial position. The industry is confident that they will continue to buy needed equipment and that their equipment requirements are tending upward. Total population of the United States has increased by approximately 18 million persons during the past decade, while farm population has declined by 2.5 million. This adds up to an increase of 20.5 million off-the-farm customers for farm products.

With the population trend away from the farms, the total number of farms is decreasing, but acreage per farm is increasing. This means more acres per farmer and necessitates more mechanical power and equipment per farm worker, for which there is no substitute. Animal power is no longer available and the pay for farm labor now indexes 403 as compared with 128 for prepar, as based on 100 for the 1910-14 period.

To satisfy the farmers' needs for tractor and other equipment, the 1949 balance sheet of agriculture as of the end of the year shows total assets of $122 billion as compared with $54 billion in 1940; indebtedness of $12 billion as compared with $10 billion, and an equity of $110 billion as compared with $44 billion. Included in the 1949 assets are deposits and currency, U. S. savings bonds and investments in cooperatives totaling $22 billion, more than four times the $5 billion of 1940. Present prices of tractors and farm equipment index only about 157 as compared with 1940.

The industry realizes, of course, that more selling will be required to attain its 1950 potential market and is intensifying its sales effort. Buyers will dominate the 1950 market, which present conditions quite different than those of the past nine years.

MASS production of fine gears is an accomplishment that requires the ultimate in manufacturing facilities and experience. And it's all here at Fairfield—metallurgical departments, batteries of the most modern machines, complete heat treating equipment, all operated by skilled craftsmen producing truly fine gears. Here is 30 years of experience translated into the gear-making "know-how" that is essential to manufacturing high quality, dependable gears.

Our facilities are complete for producing gears for a wide variety of applications. Why not consult Fairfield on your next gear problem? Your inquiry will receive prompt attention.

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MADE TO ORDER:
SPIRAL BEVEL
STRAIGHT BEVEL
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SPUR
WORMS AND WORM GEARS

Here are a few of the industries for which Fairfield supplies fine gears *made to order*
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3 ways to CUT ASSEMBLY COSTS!

DRILL IT with a B & D HOLGUN. Drills holes up to ¼" diameter in steel, up to ½" in hardwood.

TAP IT with a B & D TAPGUN. Cuts threads up to 7/16" in mild steel, up to ⅝" in brass or aluminum. Automatic reversing mechanism.

DRIVE IT with a B & D SCRUGUN. Drives machine screws to ¼", self-tapping screws to #12, wood screws to #10 x 2". Positive or adjustable clutch.

B & D HOLGUNS,* TAPGUNS*, SCRUGUNS* give you MORE WORK

Per MAN Black & Decker "Power Triplets" are perfectly balanced, weight-saving, matched in design, with famous "Pistol Grip and Trigger Switch". They're accurate and easy to handle, thus help your workers produce better with less fatigue and fewer rejects!

Per HOUR Powered by B&D-built universal motors ("tailor-made" for the specific tool they drive), HOLGUNS, TAPGUNS and SCRUGUNS have full power and speed for continuous, trouble-free operation—help you assemble more pieces per hour, *every* hour!

Per TOOL These B&D Tools are *built to last*, give you *extra* years of service! They have extra-tough gears, shaft and chuck spindle, powerful motors, husky housings, all the extra strength and stamina built into every Black & Decker Tool!

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EXPERT HELP in COST-CUTTING . . .

Let your nearby Black & Decker Distributor show you where you can save time and money with the *world's most complete line* of Portable Electric Tools! He'll be glad to make an experienced survey of your plant. Phone him today for full information.

Casting Resins

(*Continued from page* 39)

cork flour is being widely used for this purpose. The cured resin is insoluble in practically all common solvents and is resistant to acid and alkali; it can be drilled, tapped, filed, sanded, painted, and buffed to a high luster. Its strength characteristics are very good and it compares favorably in sand abrasion with cast aluminum. Properties are listed in the accompanying table. The term "casting resins" in this article refers to a phenol-formaldehyde type.

In developments ranging over the last decade certain procedures have been evolved to produce a dimensionally stable, wear resistant final cast which by these very procedures can be manufactured at lower material and labor cost. As typical applications three procedures will be discussed in detail.

Spotting racks of the type shown may be produced as follows: The model is properly prepared by sealing with acid resistant nitrocellulose lacquer-sealer and then coating with paste wax or other suitable parting agent. Then a rough wood frame which allows for one to two in. resin thickness is located over the male part and the edges are sealed to prevent leakage when the material is poured. The properly compounded resin is then cast and the whole assembly is heated to between 110 and 150 F depending on the size and shape of the rack. When completely set, after four to 12 hours depending on the mass to be cured, and after cooling to room temperature, the cast can be removed from the male part and is ready for use after checking with template or other master gage.

A typical application is the hood panel duplicate illustrated. As above, the master model must be sealed and waxed properly. A hard plaster cast is then made to obtain the reverse form. The plaster mold must in turn be sealed and coated with a suitable parting agent.

In many instances it is desirable to use cores both for permanent location or for removal after cure. In a recently developed application permanent cores have been made of Styrofoam,* thus reducing weight to a point where manual handling is feasible on large models. The cores are roughly shaped to the outline of the model permitting one to two in. thickness of resin all around the core.**

When the core is properly located the compounded resin mixture is filled in and the whole assembly cured from four to 12 hours at 110 to 150 F, time and temperature varying with size, shape, and mass of the final cast. After cooling to room temperature and removal from the mold the base is routed, and after checking the model is ready for use.

Another important application is the making of match plates of casting resin for foundry use.

The master patterns are mounted on a follow board which is machined to permit proper location and establishment of parting lines; where gateing is desired, gate patterns may be mounted simultaneously. The patterns and follow board are sealed and waxed and a flask constructed around them to hold the plaster mold. After the plaster has set the follow board is removed, leaving the patterns in position in the mold. The exposed surfaces are again sealed and waxed and another plaster cast is made as above. The two molds thus obtained form top and bottom of the match plate.

In assembling the two flasks for final casting, a V-grooved prefabricated frame containing feeding and venting openings is spaced between the two molds, and the whole assembly is securely clamped together. Thereafter the compounded mixture is pressure or

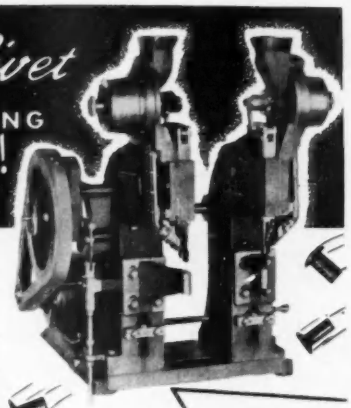
* A product of Dow Chemical Co., Midland, Mich.

** Pat. Pend., Kish Plastic Products, Inc.

(*Turn to page* 104, *please*)

Chicago Rivet

AUTOMATIC SETTING SLASHES UNIT COSTS!



If your product involves a fastening operation—wood to wood, metal to metal, fabric to fabric, composition to composition, or any combination of these—you can slash unit costs by increasing production volume with high speed Chicago Rivet Automatic Setters and Chicago Rivet tubular or split rivets. Four rivets are automatically fed, inserted and upset at one release of the foot pedal by the quadruple model Chicago Rivet Setter. Single, double and triple setters are also available.

Bench type Double Rivet Setter with Adjustable Riveting Centers

A Few Applications

AIRPLANE PARTS
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LUGGAGE
MILK BOTTLE CRATES
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PULLEYS
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STOVES
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TYPEWRITERS
VENTILATORS
WASHING MACHINES

Quick change hoppers, available as extra equipment, enable some models to switch quickly from one size and style rivet to another. Nearly all models clinch grommets, eyelets, staples and Dzus fasteners and insert drive screws—all automatically.

FREE FASTENING CLINIC

If your product is small, send us an unfastened sample. If it's large, send us a sub-assembly. We will gladly analyze your fastening problem, recommend the type rivet and Chicago Rivet Automatic Setter needed and estimate production rates that can be set up on the job.

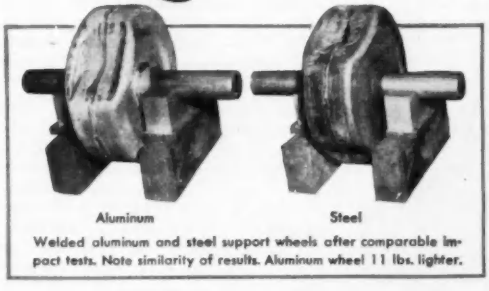
Chicago Rivet CHICAGO RIVET & MACHINE CO.
9612 W. Jackson Blvd., Bellwood, Ill.

LANDING LEGS 150 LBS. LIGHTER

...thanks to ALCOA ALUMINUM!

Chalk up another plus for Alcoa Aluminum trailer construction! Now an all-aluminum landing gear assembly, fabricated from Alcoa products, lets you lop off as much as 150 lbs. of dead weight—and add it to payload capacity. Already fully service-proved and installed on leading trailers, aluminum supports quickly pay off their higher cost in added revenues and maintenance savings. They resist corrosion, require no painting.

Join the swing to trailers of Alcoa Aluminum. *Extra* payload is the payoff! Ask your trailer builder for facts and figures that prove the profit advantages of aluminum.



Aluminum Steel

Welded aluminum and steel support wheels after comparable impact tests. Note similarity of results. Aluminum wheel 11 lbs. lighter.

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of "Payload Proof", Alcoa's new 36-page booklet on aluminum trailers. Performance records, weights, structural information. Write to ALUMINUM COMPANY OF AMERICA, 1841A Gulf Building, Pittsburgh 19, Pennsylvania.

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INGOT • SHEET & PLATE • SHAPES, ROLLED & EXTRUDED • WIRE • ROD • BAR • TUBING • PIPE • SAND, DIE & PERMANENT MOLD CASTINGS • FORGINGS • IMPACT EXTRUSIONS
ELECTRICAL CONDUCTORS • SCREW MACHINE PRODUCTS • FABRICATED PRODUCTS • FASTENERS • FOIL • ALUMINUM PIGMENTS • MAGNESIUM PRODUCTS

"JUST WHAT I'VE BEEN WAITING FOR!"

the NEW SIBLEY MODEL E-25
DRILLING MACHINE

It's not too light! — not too heavy!

Fills long awaited need for medium weight Drill Press

Sensitive drilling machine with 25" swing for high speed production, yet suitable for maintenance work. Variable speed drive—select exact speed for any size drill from 1/8" to 1"—self-locking, convenient speed control—no belts to change—tachometer provides accurate reading of spindle speeds. Powered with 1½ H. P. motor. Five spindle speed options, each with a 4 to 1 range from a low of 206—825 R.P.M., to a high of 540—2160 R.P.M., with 3 phase 60 cycle motor. Oil groove table accuracy maintained to .0007" in 6 inches—maximum spindle travel 8". Splined spindle and driving sleeve are ball bearing equipped for free floating action. Alloy steel spindle and quill precision machined and ground. Column diameter 4½". Machine weight 765 lbs. Chart shows proper speeds for different drill sizes.

Sibley Model E-25. Coolant pump is the only extra.

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gravity fed through the openings in the frame, and when completely filled the assembly is heated from two to six hours at 110 to 150 F, time and temperature again varying according to size, shape and mass of the final cast. After cooling to room temperature, the molds are removed and the match plate is ready for use.

Match plates made of casting resin exhibit excellent parting properties from sand and, as previously indicated, their abrasion resistance to sand is excellent. Plastic plates have been used successfully on jolt, squeeze, and blower machines.

Latest developments indicate that the use of core boxes made of casting resin is promising.

Keller models made of casting resin have shown considerably better wear resistance to the Keller needle than the conventional hard plaster model. Where more than one die is to be made from a Keller model, use of the plastic has resulted in accurate duplicate reproductions, also, due to their resistance to weathering and to warpage, plastic Keller models can be stored for later use.

Hammer forms for preliminary test models of sheet metal parts have been produced successfully in casting resin. Reports to date indicate that these forms are excellent in accuracy, wearability and permanence, and in numerous instances are replacing wood or low melting alloy forms.

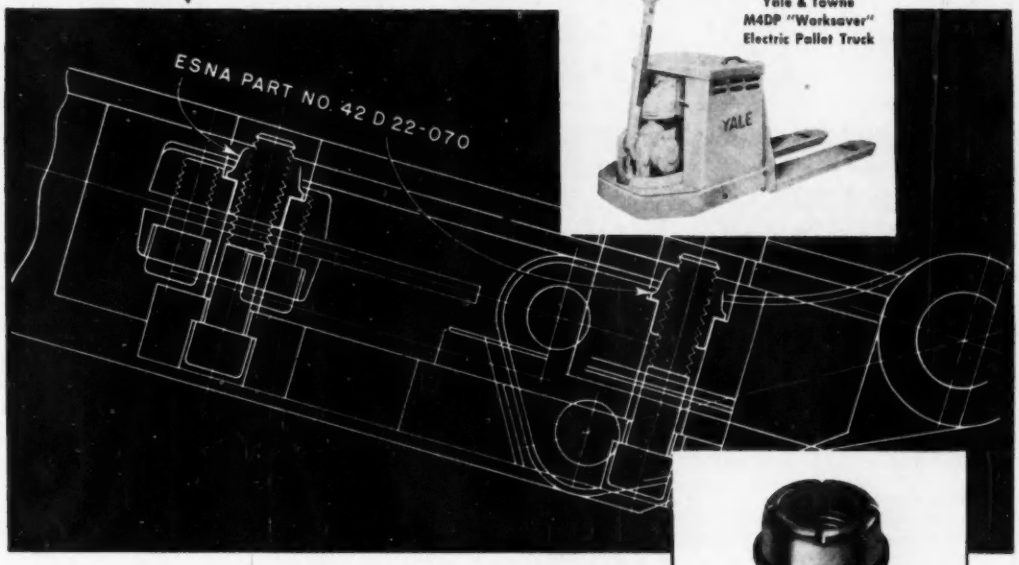
The casting resins have been used to some extent for checking of plastic die cavities both for compression and injection molding, wherever an accurate reproduction is required prior to the use of the die in the press. In many instances the end user is thus able to examine an exact replica of the production piece without the die leaving the tool shop.

Material cost of the casting resins range from $.34-$.75 per lb depending on quantity. However, most of the cost saving in using casting resins results from reduced labor, since actual handling consists of mixing the material and placing assemblies into heating compartments. To that must be added construction of frames and/or molds where necessary. In properly cured casts practically no surface finishing is necessary. During curing no attendance is needed.

Equipment required consists of a suitable heating compartment, acid resistant mixing container, and evacuating apparatus to eliminate occluded air from the mix.

Reports indicate that procedures for using casting resins have substantially reduced costs previously taken up by manual wood or metal working.

Self Locking Spline Nuts FOR COST-CUTTING PRE-ASSEMBLY METHODS



Yale & Towne M4DP "Worksaver" Electric Pallet Truck

—The Red Elastic Collar protects inaccessible bolted fastenings from failures due to VIBRATION!

After testing many types of fastenings Yale & Towne selected ESNA spline nuts as the solution for the blind mountings on the front and rear assemblies of the M4DP "Worksaver" Electric Pallet Truck featured in this ad. Loose bolts at these inaccessible locations meant loss of adjustment and mechanical wear. Their research proved that self-locking connections at these application points provided protection against unnecessary down time . . . added assurance against service calls and repairs.

This is a typical example of the growing industrial acceptance gained by ESNA spline nuts . . . especially designed for easy driving into soft gray iron, magnesium or aluminum castings. By means of this simple installation the casting is given a threaded member; a tough drilling operation is speeded up because the drill is allowed to run through the casting . . . costly tapping operations are eliminated. The self-locking collar does away with expensive cap screw lock wiring and fully protects inaccessible or blind mountings from operating failures.

In addition, if dis-assembly is required, ESNA spline nuts remain securely positioned for quick reinstallation and the famous Red Elastic Collar provides adequate locking torque for repeated re-use.

This is only one of many types of standard Elastic Stop Nuts available for special industrial fastening problems.

HERE'S A CHALLENGE: Send us complete details of your toughest bolted trouble spot. We'll supply test nuts—FREE, in experimental quantities. Write: Elastic Stop Nut Corporation of America, Union, N. J. Representatives and Agents are located in many principal cities.

THE FAMOUS RED ELASTIC COLLAR IS VISIBLE EVIDENCE OF LOCKING SECURITY

Threadless and permanently elastic, it provides these 4 outstanding features:

1. **Protects against nuts loosening due to VIBRATION**
2. **Keeps locking threads CORROSION FREE**
3. **Provides for accurate BOLT LOADING**
4. **Seals against LIQUID LEAKAGE along the bolt threads**

ELASTIC STOP NUTS

OVER 450 TYPES AND SIZES IMMEDIATELY AVAILABLE FROM STOCK

Record Year for Aircraft Industry

(*Continued from page* 38)

Technically, the industry is temporarily stymied by the transition from subsonic to supersonic speed. As predicted a year ago in these columns, supersonic speed quickly became "old stuff" during the year and the Air Force admits that it flies at supersonic speed "every day" in one aircraft or another. But the Air Force is not yet ready to commit itself to a supersonic fighter force, although the industry has already indicated its capacity to design and build such a force. Meanwhile, the industry is continuing with its transonic aircraft and devoting its principal design efforts at modifications of existing types for all-weather operation. Therefore, it is doubtful that any new types will appear during the year which have not already been programmed in experimental prototype form. Technically, the only interesting development to anticipate during the year is the jet transport but this is hardly likely to materialize quickly. Rapid progress is certain in the turbine engine field, however, and the magical figure of 10,000 hp and 10,000 lb of thrust are now being discussed as imminent.

The employment outlook is not optimistic. The industry has learned to simply get along with less people and it is interesting to note that employment remained substantially unchanged during 1949, although output increased and production requirements were changed frequently. This employment stagnation is due, in part, to a stabilization of the working force—i.e., wartime employees left and trainees were weeded out to obtain the desired skills, and permanent employees developed specialties assuring them of continuance—but of major importance is the rapid rise in wages in the industry, which requires increased stringency on the part of management.

As in all other industries, rising prices characterized the industry's activities during 1949. For example, whereas airframe output was up only a fraction over the 1948 production, the industry income was up 11 per cent over the preceding year, reflecting increasing costs and consequent charges. The production character of the industry changed drastically during the year with the output of transport aircraft down about 40 per cent from 1948 and personal aircraft production dropping about 57 per cent from the preceding year. This was compensated for by a 24 per cent increase in military airframe output which, with its higher unit value, more than accommodated the financial loss of the commercial business.

Most important production change in the industry during the year occurred in the engine field, in which the turbojet producers hit their full production stride. Although commercial engine production dropped 75 per cent from its 1948 output, military aircraft engine deliveries were up an astonishing 220 per cent over the previous year. This increase reflected not only increased output on existing types, notably by Allison Division of General Motors, but the introduction of several new types to the assembly line. Included in these latter were the General Electric J-47, and the Pratt & Whitney J-42 turbojet, a slightly modified Rolls-Royce "Nene" built under license. At the present time Westinghouse is reactivating the Naval Industrial Reserve plant at Kansas City, Mo., for production of axial-flow jet engines. However, the reciprocating engine showed no signs of dying its long-predicted death and Pratt & Whitney delivered its 4000th R-4360 Wasp Major engine. Deliveries continued on the standard P & W R-2800 Double Wasp and the Wright R-3350 Cyclone, both for commercial and military installations. A new engine entering quantity production was the Wright R-1300 of 800 hp intended for the new North American T-28

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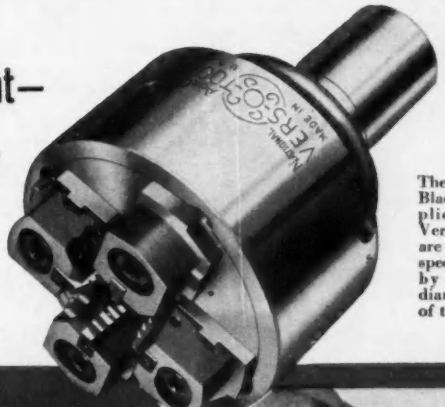
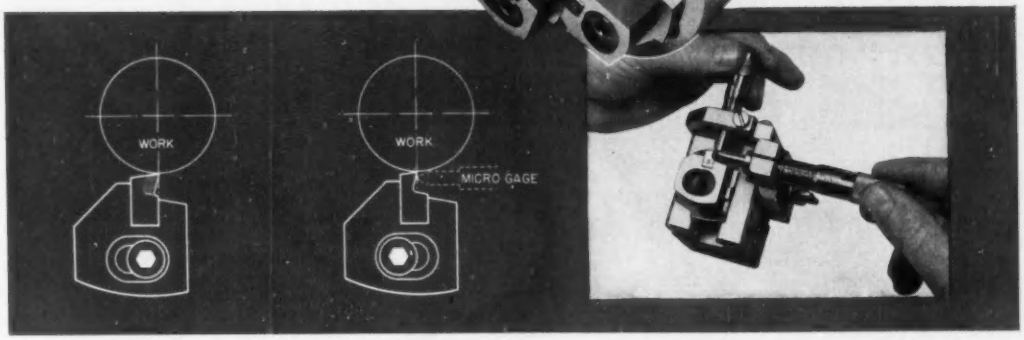


The new Adjustable Blade Chasers, applied to standard Vers-O-Tool heads, are positioned to the specified cutting size by positive, quick diametric adjustment of the head.



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trainer. In the personal aircraft engine field, the decision was made to offer geared engines in the 250-hp region, a new development for personal aircraft, which have usually used direct-drive engines. Lycoming offers geared engines in four, six and eight cylinders developing from 160 to 400 hp. Continental Motors has developed a geared version of its well-known 185 hp lightplane engine and Aircooled Motors has available a new 250/275 hp geared engine.

North American, in company with Lockheed and Republic, developed all-weather versions of its production fighter airplane. The YF-86D features a nose location for its radar antenna, which necessitated lowering of the nose air intake. The Air Force has announced plans for quantity production of the new F-86D model of the world's record holding Sabre swept-wing fighter but says it may switch the order to the newer North American XF-93, which uses flush air inlets alongside the nose, thereby leaving the radar housing clear of impedimentia. Republic developed flush air inlets for its well-known F-84 Thunderjet and freed the nose for a radar installation. Lockheed is assured of Air Force procurement of its new XF-94, a development of its two-seat TF-80C trainer with nose-mounted radar.

In the bomber field, Boeing continued to improve its swept-wing B-47 six-jet bomber, and the Air Force plans another installment on its elaborate purchasing program for this 600 mph craft. The addition of four jet engines to the huge Convair B-36 provided substantial increase in its performance and the Air Force will buy more of the controversial bombers to outfit four heavy bomber and two strategic reconnaissance groups, a total of more than 200 of the 150-ton giants.

Douglas made important modifications to the Globemaster transport and the C-124 Globemaster II has huge clam-shell doors in its nose to permit ramp loading of heavy equipment. It can carry 50,000 lb of payload and the Air Force plans to increase its current orders for this type. Boeing is scheduled for additional orders for its C-97 Stratocruiser.

The scheduled airlines joined the manufacturing industry in the profit column during the year by ringing up a surprising $44,830,248 profit during the year. They smashed all records by flying nearly 9 billion revenue passenger-miles during the year and more than 180 million ton-miles of express and freight, a 24 per cent increase over 1948. Despite four tragic accidents, which took the lives of 93 passengers, the airlines showed a safety record of 1.3 passenger fatalities per 100 million passenger-miles flown, as low as any previous year. The international routes had no fatalities during the year.

The low level of personal plane activity is explained by the 62 per cent drop in student pilot certificates issued by the CAA, accompanied by a 66 per cent drop in private pilot certificates. This combination of low pilot certificates and low personal aircraft sales was reflected in the closing of more than 400 airports due to lack of activity.

From the events and trends of the past year it is possible to detect a growing maturity of the aviation business, a maturity characterized by retrenchment rather than its historic expansion, a devotion to the financial problems of the industry rather than its promotional ones, and a growing accent on management and economy rather than technical virtuosity. Rapid research gains during the postwar years have made available to the industry a vast fund of design data with which the great majority of its technical problems can be solved. Therefore, industry technical achievements no longer claim the concentration they once enjoyed but rather it is the production line, the sales force and the finance committees that receive major emphasis in the 1950 industry.

The virtual "capture" of the industry by military procurement is not regarded as alarming by industry leaders, who see not the slightest threat to

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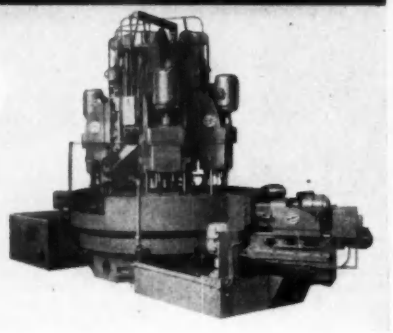

Here's a good example of the application of standard machine units to a special production job. Drilling and reaming operations of suspension support holes are performed on both right-hand and left-hand parts simultaneously. Drilling and reaming king pin holes is also included. Six stations, five operating and one loading, handle all operations with a total of 16 spindles. Machines of this type can be furnished from standard basic units for special applications on most all metalworking operations.

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Machines similar to this can be designed to handle dissimilar operations in the same parts or one operation on continuous production. An indexing table with ROTO-MATIC POWER HEADS is easily arranged to suit special machining operations.

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their competitive system. Many are uncomfortable over the increasing red tape required by the manifold provisions of Government business, particularly the renegotiation privileges, the Vinson-Trammel requirements and the increasing accent on sub-contracting with its dangers in the event of contract cancellation.

Government "control" of the industry brings with it the customary impairment of freedom and the dangers of political favoritism but the industry is on record unanimously and flatly rejecting the charge of politics in procurement, and most insist it is still the "cleanest" business in the world. The long-felt nostalgia for the activity of the 1944 level has now disappeared and the aircraft industry enters 1950 more realistic, more mature and far more solvent than at any time since the end of the war.

Casting Process Improves Tensile and Yield Strength

A new process which simultaneously casts, molds, forges and coins metal products has been developed by Budds Aero Castings, Inc., Canaan, Conn. Known as the Bacco process, it is particularly applicable to such metals and alloys as aluminum, brass, bronze, and copper, and is said to improve tensile and yield strength by 10 to 40 per cent. In many instances dimensions of work pieces may be held to tolerances of 0.001 to 0.002 in. per in.

A conventional hydraulic press of sufficient capacity is employed in the Bacco process as the metal is poured by gravity and is not compressed until it is within the die. Die design varies greatly with size and shape of the product, but in all cases the action of the press applies pressure uniformly through the entire surface of the male and female portions of the die. Constant pressure is applied to the die throughout the entire cycle of the process.

Castings are made by the new method as follows: With the dies set up in the press, molten metal is poured through the die to drive out any gas which otherwise might be entrapped. While metal is still flowing, the press ram closes down on the die to compress the molten metal and to continue this pressure while the metal is hardening and after it has hardened. This process is said to provide a fine granular structure with practically no porosity. The coining action increases strength and hardness of the casting. Die temperature is thermostatically controlled and depends upon both the type of casting and the metal used.

Parts have been produced by the Bacco process for a number of industries including automobile and aircraft manufacturers. To date, the largest casting made measured about six by eight by four inches.

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Tractor Gears

(*Continued from page* 48)

tractor and ran gears for this unit. After three months we switched to a third.

With our modernized setup we have a great deal more flexibility and are able to switch production more often, as required, to meet sales conditions. Excess hobbers replaced by the Shear-Speed have given us a badly needed supply of machines for our service department, the operation of which has been greatly improved as a result, with quicker delivery of service gears to the field when needed.

Quality

An idea of the quality of gears produced may be obtained from our inspection of specifications. All shaved gears are checked to pin readings, 1200 to 1 magnification, and Red Liners are used. Specifications call for true involute to 0.001 in. full on pitch line. Lead error per in. is given as within 0.0007 in.

Actually, once sizes and settings of the shaving machines have been established, the machines turn out gears with small variance — approximately plus or minus 0.0001 in. That's pretty good for tractor gears.

Hypersonic Wind Tunnel

(*Continued from page* 50)

ture lenses to disturb the parallel beam, and the disturbance is recorded by a specially designed camera which can photograph a ⅛-in. circular area at one time.

Special means are used to remove moisture from the air before it enters the tunnel. The tunnel can be run from 10 to 20 hours before it is necessary to reactivate the drier.

Fifteen compressors, which require 900 hp to operate, supply air for the tunnel, thirteen of them are of the rotary vane type and two are of the double-acting, reciprocating type. The piping arrangement of the compressors can be varied by a system of valves; for example, twelve of the compressors can operate in parallel, or all fifteen can be arranged in series to operate in six stages.

Air from compressors flows first into a supply reservoir tank three ft in diameter and 12 ft long, with steel walls varying in thickness from 1½ to 2½ in.

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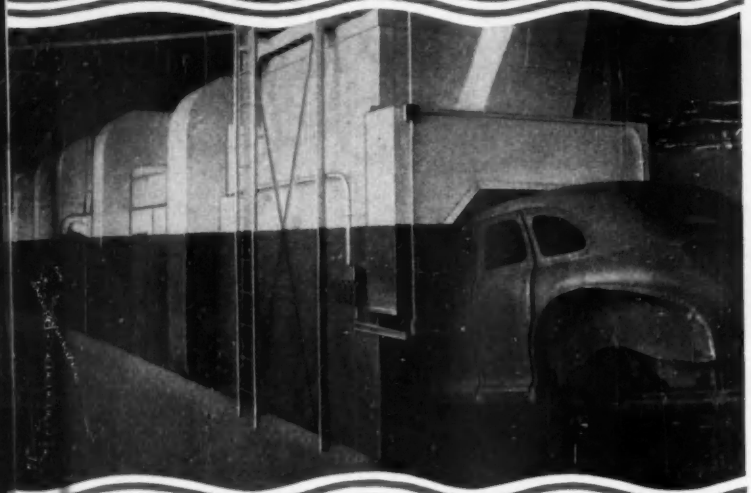

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Stamped Steel Parts

(*Continued from page* 45)

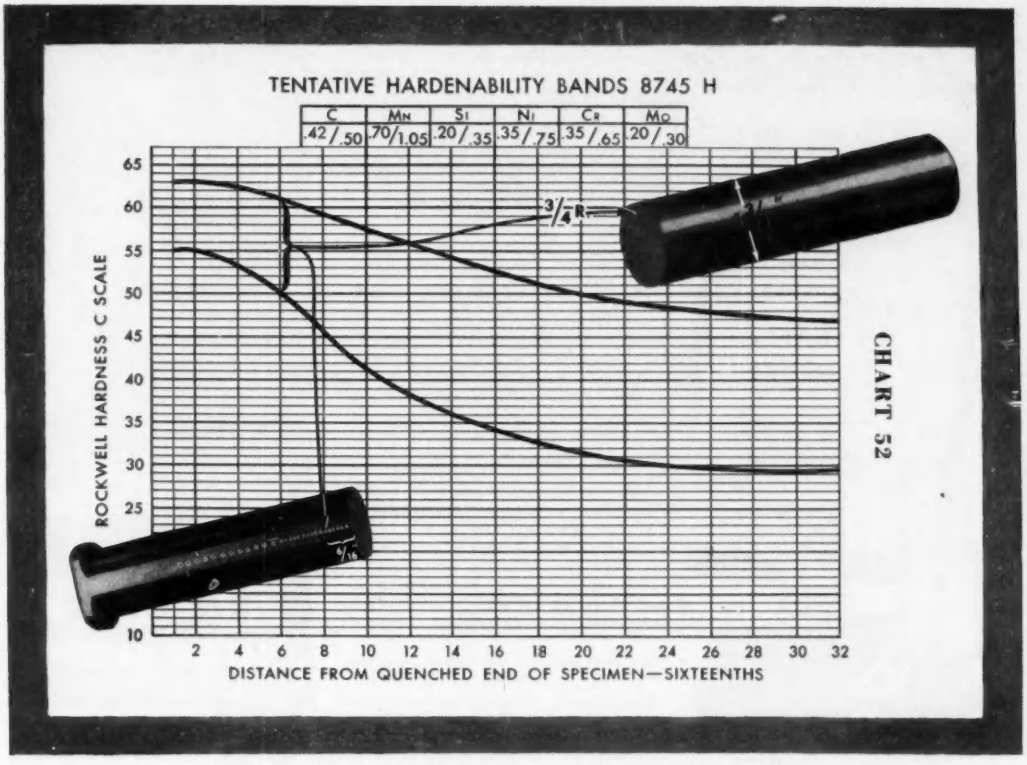
shearing caused by the force of the fluid at stall. The tabs, needed to hold the vanes initially, impart additional retaining strengtn after brazing and distortion is prevented by the proportions of the outer race hub. After brazing, the hub is finished turned, induction hardened, and ground.

Two tongues on the impeller hub provide a drive for the front pump in the transmission. The hub is machined from tubing, silver brazed in the housing, finish machined, then induction hardened and ground. It rotates in a bushing in the transmission.

Assembling and retaining the turbine and impeller vanes in their respective housings so they cannot vibrate in the finished assembly is accomplished by a combination of preloading and interference fits and is the culmination of several years' work. The turbine shell has three pierced through slots for each vane (outer, middle, and inner). The outer and middle tabs on the vanes are just long enough to pass through while the inner one is long enough to be bent over and has its intermost edge shaped to give a ramp and a locking shoulder. The vane is formed slightly flatter than its finished shape. The chordal distance between the inner end of the inner slot and the outer end of the outer slot is slightly less than the same distance between tabs on the vane, resulting in an interference fit. With the outer tab inserted first the inner tab will easily enter its slot part way but requires some pressure to snap it into place. In the process the vane is first overbent, while the hump on the ramp passes through the slot, then takes on its final form when the locking shoulder seats in place. Meanwhile, the middle tab falls into place in its slot. At this stage the vane has considerable preload in it and feels quite rigid. The inner tab is bent over on the front side of the shell as an added precaution, then a reinforcement plate is spot welded at its outer edge to the front side of the turbine shell. It lays over the bent down vane tabs and is riveted with the turbine shell to the turbine hub.

A tab on each vane passes through a slot and is bent over to hold the core ring, the outer diameter of which has diagonal notches formed in it to position the entrance edge of the vane. However, the diametrical distance between the bottoms of these notches is somewhat greater than the diametrical distance between the edges of the vanes into which the core ring must fit. To accomplish assembly, a fixture ring, having shallow slots cut at an angle in its bottom side, is screwed over the vanes to prevent them from bending

(*Turn to page* 116, *please*)



This hardenability chart for 8745 H shows that the Rockwell hardness at a point 6/16 in. from the quenched end of a Jominy specimen is the same as that found at the three-quarter radius of a 1-3/16-in. bar section quenched in agitated oil.

How You Gain by ordering to Hardenability

Bethlehem's production of alloy "H" steels has more than doubled in the last two years. Progressive buyers of steels in all industries are now specifying hardenability bands to promote uniformity. This provides worthwhile advantages, as top extremes in hardenability frequently cause quenching cracks, and bottom extremes may mean failure to obtain the effectiveness of quench desired.

For example, a 1-3/16-in. round must be quenched in oil to produce Rockwell C-50 minimum hardness at the three-quarter radius. Standard cooling rate curves for a mildly-agitated oil quench show the commensurate distance from the hardened end of the end-quench test to be 6/16 in.

When this required distance is located on an established hardenability chart, such as the one illustrated, we find that 8745 H analysis will produce 50 minimum and 61 maximum hardness. This indicates that 8745 H meets these particular requirements. The possibility of getting an 8745 type steel of lesser or greater hardenability is eliminated if the "H" steel is ordered.

Hardenability charts similar to this have been published by the AISI covering all of the popular alloy steel grades.

Whether you order to hardenability or whether you use the conventional methods, Bethlehem metallurgists will be glad to help you with your analysis, heat-treatment and machining problems. We make all of the alloy steels listed by AISI, as well as special grades.

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when the core ring is pressed in place. The hole in the fixture ring equals the diametrical distance between the inner edges of the vanes. As the core ring is pressed through the fixture ring it contracts, enters the vane area freely, seats home as it passes through the ring and expands against the vane edges. This causes a radial loading on each vane, positions the vane firmly in its notch, and prevents any free vibrations at this critical point.

The core ring in the impeller performs the same function, however, the design of the slot in the impeller housing for receiving the vane tabs is distinctly original. To eliminate extra pieces and at the same time bring the fluid into direct contact with the outer housing, for better heat dissipation, the impeller vanes are set directly in this housing. Each vane has three tabs and the slots to receive them, instead of being pierced completely through, are pierced only partly through, sufficient to give good engagement to the vane tab but not deep enough to cause fracturing of the metal and leakage. This is accomplished by carefully relieving the outer die section in line with the punch on the inside, giving the metal somewhere to go without fracturing, and causing a small bulge on the outer surface.

As described for the assembly of the turbine vanes, dimensional interference exists between the impeller vane tabs and the slots, in the housing, except that the inner end of the vane has no apparent tab. Instead it is shaped to a blunt point which is snapped into its slot after having first inserted the outer vane tab. The inner end is locked firmly in place by the simple expedient of displacing some metal from the housing over it by a staking operation in a press.

Not shown in the illustrations is a combination of fan blades and shroud formed in one piece and welded to the back side of the impeller near its outer diameter. Cool air entering the bell housing at the rear is carried outwardly between the shroud and the surface of the impeller and expelled at the largest diameter of the housing. A considerable amount of air is moved through quietly and with a strong wiping action over the surface of the impeller housing, resulting in sufficient cooling for the oil in the transmission to care for the most extreme conditions. This is direct air cooling and precludes the necessity for an oil cooler or outside piping.

The stator assembly includes an outer race, brazed integrally with the ring and vanes, an inner race splined to a fixed sleeve extending from the transmission, a one-way sprag-type clutch made by the Spring Division of Borg-Warner and, on either side of it, a bearing to maintain concentricity and absorb the thrust between the turbine and impeller.

At a later date a more complete article may be forthcoming.

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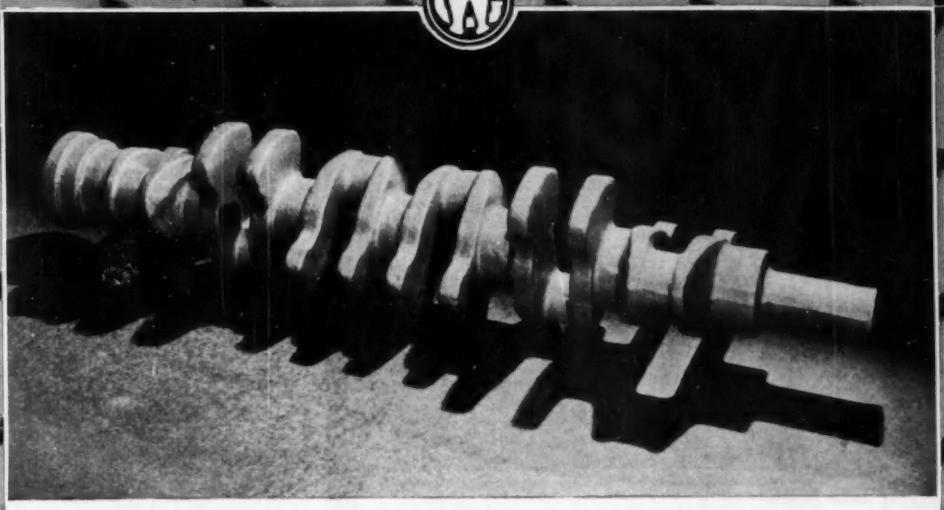

Diesel Power has become a major factor in the truck and tractor field. Here again Wyman-Gordon crankshafts are the standard of the industry.

Crankshaft Specialists since the birth of the internal combustion engine and today the largest producer of crankshaft forgings, Wyman-Gordon furnishes die forged cranks of all types and in weights up to a thousand pounds.

Standard of the Industry for More Than Sixty Years

WYMAN-GORDON

Forgings of Aluminum, Magnesium, Steel

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Profit by Set Screw Specialization on Puzzling Set Screw Problems
Over 1200 Manufacturers, large and small, depend on Setko for Set Screws. Do you have set screw problems like these: Tough Service; "Tricky" Applications; Small Sizes; Special Materials; Rush Shipments? Then Setko can help you. Write, wire or phone today for catalog, in-stock lists, quotations.
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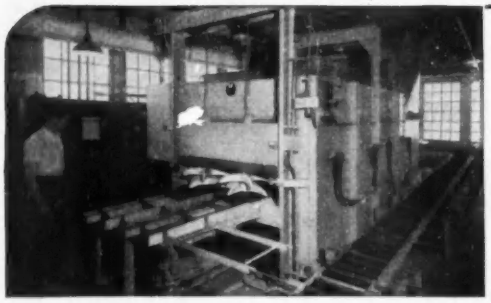
Zip-Grip is first with Triple-Locking Action: Interference Fit PLUS Tension PLUS regular Locking Action of Set Screw on Shaft or other part. Also the first to require no supplementary devices or deformed threads. Licks vibration and locks instantly, any given place. For complete description and application data write for new Zip-Grip Data Sheet.
SETKO
Set Screw & Mfg. Co.
*Pat. Pend.
16 Main St., Bartlett, Ill.
We Specialize in Solving Puzzling Set Screw Problems



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Salem - Ohio

Publications Available

(*Continued from page* 56)

H-21 Resins and Plastics

Bakelite Corp. — Two booklets are available from the company. 1) Completely new publication, "Vinylite—Vinyl Butyral Resins." General properties are discussed and tables giving basic properties; types of wash primers, etc. 2) A revised edition of the illustrated booklet "Vinylite Resins and Plastics." Forms, properties and applications are discussed and property tables are included.

H-22 Punch Presses

Diamond Machine Tool Co.—An 8-page catalog in color describes large Diamond bolster area double crank punch presses of 30-ton capacity. The catalog describes and illustrates many of the features on the Multi-Max presses with complete specifications. Special models with friction clutch and variable speed arrangements are also illustrated and described.

H-23 South Wind Products

South Wind Div., Stewart-Warner Corp.—Production facilities, skills and products of the division are presented in a 20-page brochure. The pages are devoted to pictures of machine facilities offered—screw machines, drill presses, punch presses, welding machines, etc.—showing typical parts or items produced by the machines or processes illustrated. Assembly and inspection facilities and a listing of all production equipment conclude the booklet.

H-24 Maintenance, Safety and Production Equipment

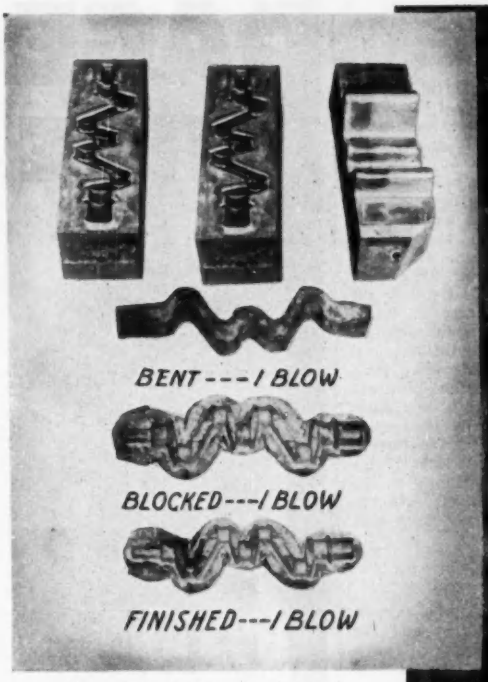
The Martindale Electric Co.—Catalog No. 28 covers production equipment, commutator maintenance, motor maintenance, electrical maintenance, safety equipment and mechanical maintenance. Price lists and specifications for the various items are included.

H-25 Measuring Machines

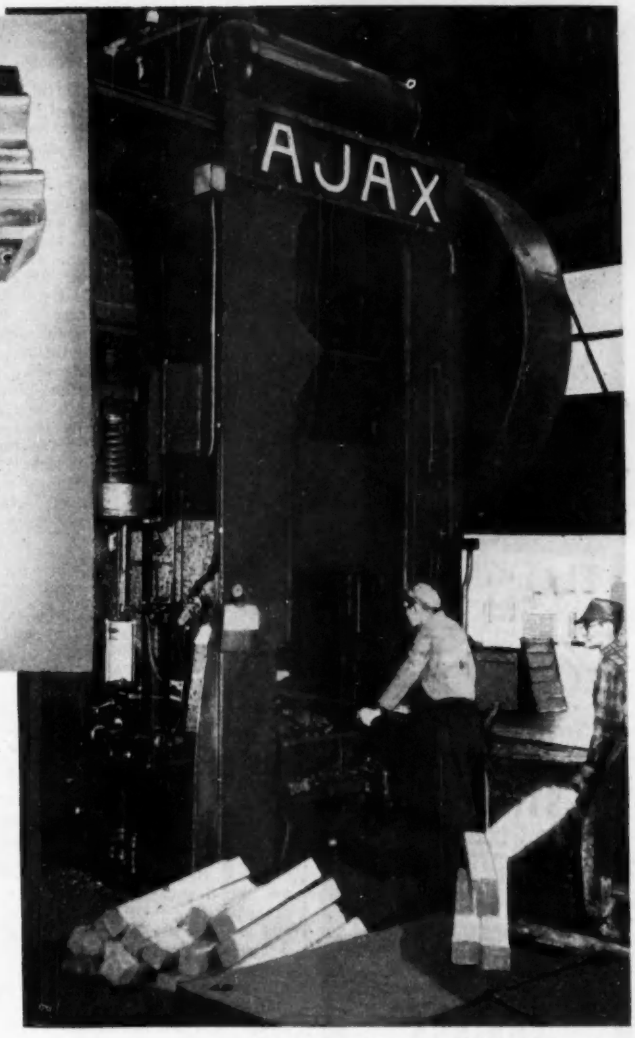
Pratt & Whitney—An attractive new circular covering standard measuring machines is available. Features of the measuring machine, accessories and specifications are included in the circular.

BOOKS

WELD DESIGN, by *Harry D. Churchill* and *John B. Austin*. Published by *Prentice-Hall, Inc.*, New York, N. Y., price $6.65. Besides treating the subject of weld design for machine bases from both the practical and theoretical standpoints, this book gives a thorough understanding of the materials that enter into machine-base construction and a clear picture of the many methods of processing plates and structural shapes.



Dies and Forging Operation for Forging Tractor Crankshaft.



Press Forging Tractor Crankshaft at International Harvester Company, Louisville, Kentucky, Works.

INTERNATIONAL HARVESTER COMPANY

PRESS FORGES TRACTOR CRANKSHAFTS

In the Louisville, Kentucky, works of International Harvester Company, tractor crankshafts as well as axles, steering knuckles and gear blanks are being forged on Ajax High Speed Solid Frame Forging Presses. Ajax Forging Presses afford many production advantages not present in other types of presses, such as solid steel frames without tie rods, greater simplicity of operation, lower maintenance, etc.

The same economies which are effected in press forging tractor parts, apply to an extensive list of parts, in many industries, which can be press forged better, faster and at less cost than by any other known method.

Write for Bulletin 75-B

THE Ajax MANUFACTURING COMPANY
EUCLID BRANCH P. O. CLEVELAND 17, OHIO
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DEWART BUILDING NEW LONDON, CONN.

1
SOURCE FOR ALL PARTS YOU NEED

LOCK WASHERS

High carbon steel, bronze, aluminum, stainless steel, monel metal, spring lock washers . . . finished or plated with cadmium, nickel, brass or copper. Also Garrett's Aluminum Spring Lock Washer—light in weight with strength of steel.

FLAT WASHERS

Made to meet ASA and SAE specifications in regular steel spring steel, stainless steel, brass, bronze, monel metal, aluminum, Alclad and copper. Can be plated with zinc, cadmium, nickel, brass, chrome . . . or can be parkerized.

STAMPINGS

From a small part for electronic instruments, automotive stampings and television chassis . . . Garrett can fabricate them better and cheaper than is possible in your own plant. Years of experience and modern high speed equipment assure speed deliveries . . . finished to your specifications.

SPRINGS

Flat and coiled springs to meet every requirement. Every Garrett spring has controlled tension built into it to assure satisfactory performance under all conditions. All types of flat springs . . . coil springs—compression, extension . . . made of round, square or rectangular wire.

MANUFACTURED BY
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PHILADELPHIA 34, PA.

GARRETT
MANUFACTURERS OF SMALL PARTS

AIRBRIEFS

(*Continued from page* 60)

sequence as this, it is doubtful that the Board would have published the report had it not been in general agreement with its conclusions. No good reason has yet been advanced by American Airlines for its desire to sell its highly profitable and promising overseas subsidiary. AA has spoken only vaguely of a "desire to remain in the domestic field," etc. Every reason exists for Pan American's offer of $17,450,000 cash for the property. Between the two stands TWA's adamant Ralph Damon, former American Airlines prexy, whose overseas operation is due for some gentle squeezing when PAA becomes its only competition. We are compelled to agree with a statement made by the CAB Public Counsel in the matter when he said: "The further this deal goes, the worse it looks!" This is the Board's big opportunity to act judiciously in a matter of vital importance, and we sincerely trust that it will.

Allison Turboprop

The world's first turboprop engines were the Rolls-Royce Trent and the General Electric TG-100, which ran a neck-and-neck race to become the first in the air in the fall of 1945. Both were simply existing centrifugal-flow turbojet engines with their shafts geared down to propeller shafts. Thus, the U. S. has been in the turboprop business just as long as anybody in the world. However, this powerplant has not received the development support that it has in England and has lagged as a consequence.

The U. S. Navy, which has the most use for a turboprop, stuck with the problem through the years, however, and recently announced successful development of the most powerful turboprop engine in the world, the 5500 hp Allison T-40. Actually, this power plant consists of two T-38 axial-flow units geared to a common shaft. It is this 2750 hp unit that should hold the most immediate promise for commercial transport application. Assuredly there are few aircraft in the world capable of handling 5500 hp in existing installations (four T-40 units are going into the huge Convair XP5Y-1 flying boat), but the T-38 unit should prove ideal not only for conversion of existing transports, such as the Convair Liner and the Martin 2-0-2 (both of which are slated for the conversion) but for new design as well. Because the turboprop is essentially a propeller power plant, the problem of power absorption by a propeller became paramount. Therefore, unlike the turbojet (in which great power is a logical design goal), there appears to be an optimum unit power beyond which adequate accommodation cannot be made economically.

(*Turn to page* 122, *please*)

PAGE WIRE

LOW CARBON
HIGH CARBON
STAINLESS
SPECIAL ALLOY
ARMCO IRON

ROUND
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You draw the Shape
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—the way you want it for your production—whether it's ALL of your product, or only a part.

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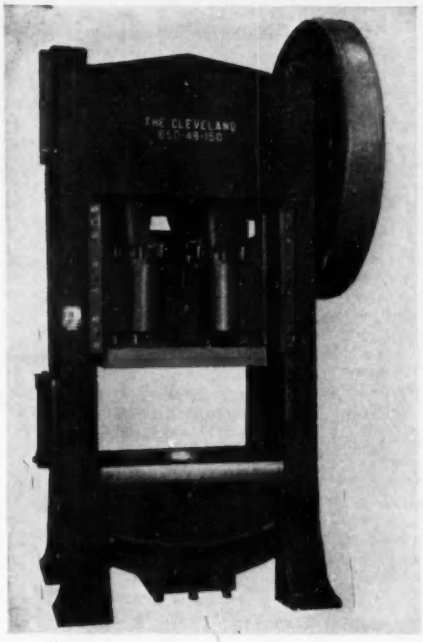
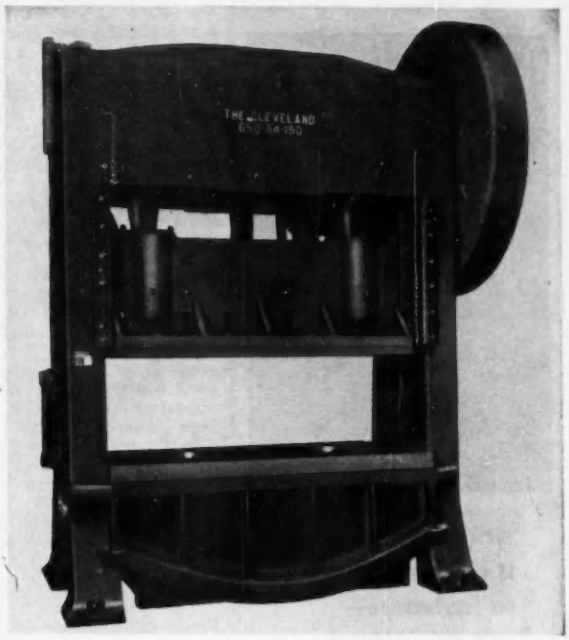


Cleveland straight sided Double Crank Press bed area 36" x 48", capacity 150 tons.



Cleveland straight sided Double Crank Press bed area 44" x 84", capacity 150 tons.

Specify CLEVELANDS for the "pressing" needs of 1950

The year 1950 will bring an even greater need for lower production costs. Increase man-hour output by modernizing your fabricating lines with new Cleveland Presses! Important design improvements have been incorporated in all Cleveland Presses that offer increased production economies. Cleveland engineers will gladly work with you on your production problems. If a standard Cleveland Press does not suit your requirements, one can be built to your exact specifications.

Investigate these Clevelands

- Inclinable
- Horning
- Punch Type
- Gap Type
- Straight Sided
- Knuckle Joint
- Trimming
- Single Point
- Two Point
- Four Point
- Double Action Toggle

Don't overlook the many advantages offered by the "Cleveland (patented) Drum Type Clutch". A-5008

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THE CLEVELAND PUNCH & SHEAR WORKS CO. U.S.A.

Established 1880

FABRICATING TOOLS

CLEVELAND 14, OHIO

• • • • • • POWER PRESSES • • • • • •

We believe Allison will be overlooking a good bet if it promotes its huge T-40 to the exclusion of the handy T-38-size unit.

Battle Won?

The struggle to bring air travel to the public may have been won as you read this. According to unofficial tabulations of the 1949 traffic of U. S. trunklines, 50 per cent of all the people who traveled during the year did so by air! That means that from now on *more* people will travel by air than by any other means in the United States! (These figures are for "first class" travel and do not include coaches, commuter, etc., traffic.) The U. S. Immigration and Naturalization Service reports that during the 1949 fiscal year a total of 1,968,424 people either left from or arrived in the United States from foreign countries. Of this total 943,419 traveled by ship and 1,057,750 traveled by air! Obviously, the battle has been won resoundingly in the overseas traffic. It would appear that 1950 marks the end of the "adventure" of air transportation and the beginning of its responsibilities.

From the Outside In

The necessity for extremely smooth exteriors on high-speed aircraft has presented fabrication difficulties of increasing concern. Fairey Aviation Co. has come up with a possible solution through the use of exterior jigs in which the skin is placed first. Stringers, frames and bulkheads are then added as required with the result that the mold line of the skin is held to accurate dimensions and the tolerances add up inboard, where filing and fitting are more easily accomplished. This system can only be used, of course, where the structure is split in two halves, each formed from the outside in.

Dearborn Motors Appoints Miller to Research Staff

Dearborn Motors Corp. has announced the appointment of Ray J. Miller as manager of the research department. Before joining the company last May, he had been associated for several years with Bendix Aviation Corp. and with Bendix Hydraulic Brake Co.

Industry Looks for Higher Replacement Tire Sales

The tire industry is looking for an increase in replacement tire sales this year. Findings of a nation-wide survey made by Goodyear Tire & Rubber Co. indicates that replacement tire sales should run about 15 per cent higher than they did last year.

when it comes to fasteners— can you afford anything but the best?

A *good* fastener costs very little more to buy than an ordinary fastener.

But—anything but the best fastener can add costs in terms of assembly time and high reject ratio.

That's why it pays, for very little more, to buy *good* fasteners.

Scovill Makes Good Fasteners

Recessed Head Screws • Semi Tapping Screws • Standard Machine Screws • Special Cold Headed Parts

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Industrial Fastener Sales, Waterville Division Scovill Manufacturing Co., Waterville 14, Conn.

New York • Detroit • Wheaton, Ill.
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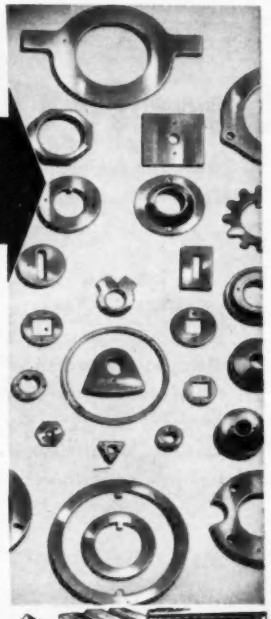
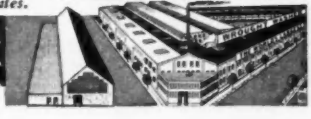
Since 1887

MILWAUKEE WROT WASHERS



Better **WASHERS . . . Competitively Priced**

Large volume production, the most advanced methods and facilities, plus more than 60 years of continuous experience in the manufacture of Washers, are factors that enable us to offer you top quality washers and stampings at competitive costs. Over 22,000 sets of dies for making Washers of every type (Standard and Special), from every type of material, for every purpose, in any finish. STAMPINGS of all descriptions; Blanking, Forming, Drawing. *Submit your blueprints and quantity requirements for estimates.*



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The World's Largest Producer of Washers
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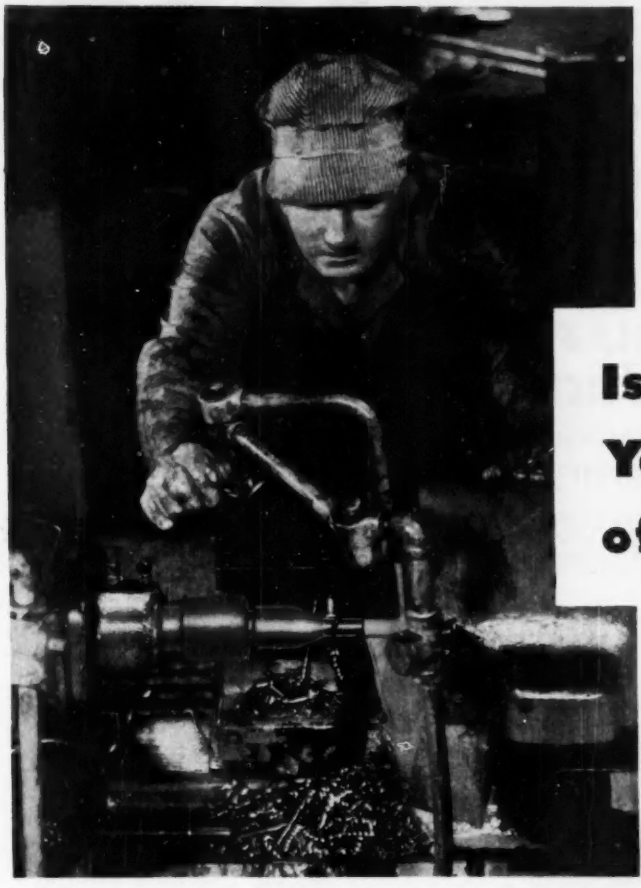

Is Machining Your Method of Inspection?

If you depend on machining to locate hidden defects in parts or material, you pay an exhorbitant price for "inspection"—through wasted labor and machine time. Further, there may be defects "getting by" that can later cost someone plenty in trouble and dollars.

Machining defective materials is a dead loss! Inspection with *Magnaflux is the modern, economical way that locates defects *before* machining. It is fast, non-destructive and *accurate*. If there is a defect Magnaflux locates it — positively, clearly and unmistakably, whether it is a surface or subsurface crack, a forging lap, a tear, or what have you? Inspection on an engineered Magnaflux unit proves cheaper than even visual inspection, as well as more effective.

Magnaflux inspection is a proved way to turn wasteful losses into profitable operations. That is mighty important to you today. Take just a minute or two right now to write for full particulars.

*Magnaflux, trademark of Magnaflux Corporation applied to equipment and materials for use with magnetic particle inspection.

MAGNAFLUX CORPORATION

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ENGINEERS in every field can benefit by following the formula M = PT (Morse means Power Transmission) when faced with complex or new design and application requirements.

Morse Power Transmission Products are important to engineers because they are ideally adaptable design-wise . . . and are available in a wide range of sizes, ratings and capacities.

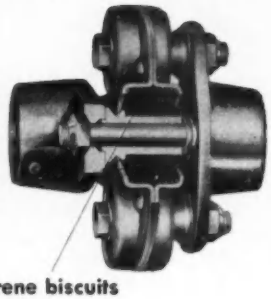
NEW DRIVE SHAFT APPLICATION— A PROVEN SUCCESS STORY

Self-propelled equipment engineers discover that Morflex Drive Shafts solve tough service and design problems encountered with engine front-end power take-offs

Equipment Builders using industrial engines and hydraulic units know that the best source of power for hydraulic pumps is the engine front end. To solve the problem of front-end torsionals, isolating vibration and shaft misalignment, engineers are now using Morse Morflex Drive Shafts.

Morflex Couplings are torsionally flexible, absorb shock, compensate for misalignment, reduce bearing wear and possible leakage from hydraulic pump seals.

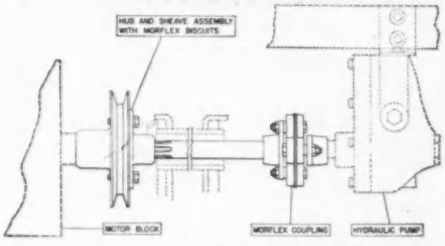
Morflex Drive Shafts with Morflex Couplings are readily adaptable to your front-end power take-off applications, too. Mail coupon below for Morse Morflex catalog which gives complete data on special and standard design adaptations.



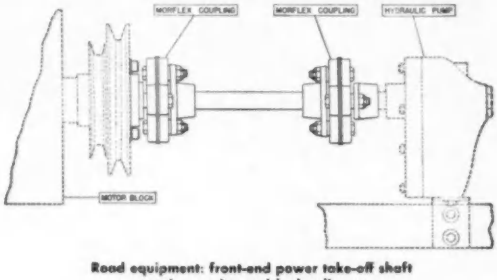
Morflex Couplings which are used on Morflex Drive Shafts have no moving parts to wear, require no lubrication or maintenance—are not affected by water, dirt, oil or weather extremes.

Neoprene biscuits

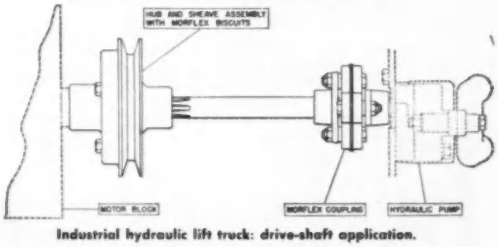
Actual front-end power take-off designs incorporating Morse Morflex Drive Shafts as applied to self-propelled equipment by leading manufacturers.



Tractor with front-end loader, using Morflex Drive Shaft.



Road equipment: front-end power take-off shaft connecting engine and hydraulic pump.



Industrial hydraulic lift truck: drive-shaft application.

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Detroit 8, Mich.

Please send me 24-page Morflex Catalog C41-48.

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Company _____

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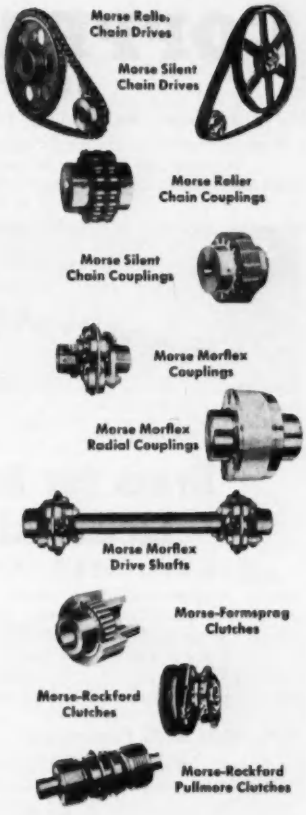
City _____ **Zone** _____ **State** _____

..... Morse *means* Power Transmission



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Ask the Morse Man for power transmission information!

100 Morse Branch Offices and Distributors to supply your power transmission demands.

From coast to coast there are more than 100 offices, representatives and distributors of Morse Power Transmission products to give you quick information and service when you want it—where you want it. *Ask the Morse Man first in any case!* Check your classified phone directory under **"Power Transmission"** or **"Chains"** for the nearest Morse Man.

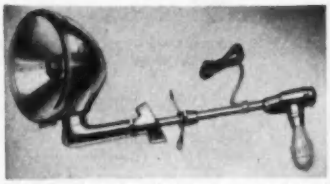
(Advertisement)

COPPER ALLOY BULLETIN

ELECTRICAL MANUFACTURING EDITION

REPORTING NEWS AND TECHNICAL DEVELOPMENTS OF COPPER AND COPPER-BASE ALLOYS

Prepared Each Month by Bridgeport Brass Co. "Bridgeport" Headquarters for BRASS, BRONZE and COPPER



Brass is used for the reflector and housing of the Perfection Telebeam Spotlight. Both brass and silicon bronze serve best for the vital parts of the Vis-O-Lite illuminated cigarette lighter. Courtesy Casco Products Corp., Bridgeport, Conn.

Brass for Automotive and Electrical Accessories

Reduction of cost without sacrificing quality is uppermost in the minds of design and production engineers. The merits and demerits of available metals and alloys for fabricating long run items, such as automotive and electrical accessories, should be carefully weighed.

More Easily Fabricated

Brass, from long experience, takes the first choice because of its ease of workability and many other advantages. It can readily be stamped, formed, drawn, spun, swaged, drilled, threaded, soldered, welded, polished, plated.

For electrical applications the high conductivity of the brasses is advantageous where the parts are designed to carry current.

Aside from the fact that it can stand deep draws and can be made into intricate shapes, its low coefficient of friction with steel means remarkably long tool life. Its initial cost is partially offset by its high scrap value as compared with other materials.

Another important property that should not be overlooked is its excellent corrosion resistance to moisture and weathering.

Since automotive accessories are exposed to the rain, sleet, snow, dampness, and extremes of heat and cold, a non-rusting metal is desirable in the manufacture of high quality products. Although modern chromium plating gives an attractive finish to most metals, time soon reveals the weakness of an inferior metal since chromium plate may be porous and does not give complete protection from the elements. Chromium plated brass over an under coat of nickel plate retains its beauty for many years, requiring only an occasional removal of surface grime with a damp cloth.

Some savings can often be obtained in reducing the cost of polishing previous to plating. Because of its intrinsic hardness or resistance to abrasion and wear, brass takes on a polished finish quickly with the minimum of effort. However, in some cases, the polishing time can be reduced by obtaining metal of the proper grain structure. Informing the mill as to the operations and finish required will enable it to supply metal with the structure which will produce the greatest economy.

Importance of Annealing

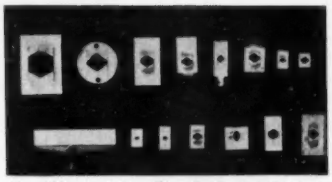
At the same time, fabricators should realize that the original microstructure of the metal as it comes from the mill changes with the subsequent annealing operations which it may receive during fabrication. In other words, the fabricator should control the grain structure of the metal during his own annealing just as carefully as the mill performs this important operation. As frequently mentioned, a coarse grain structure results in a rough surface which requires considerable cutting down to produce the necessary high polished effect. A fine grain structure, on the other hand, produces a smoother surface which requires less polishing and color buffing.

Phosphor Bronze for Speed Nuts

The old adage, "a chain is only as strong as its weakest link," probably caused engineers at Tinnerman Products, Inc., Cleveland, Ohio, to select Phosphor Bronze for their speed nuts.

These small but vital spring parts must withstand constant tension and vibration. In the assembly of a mechanism, the metal in the nut must take a sizable deflection without setting, or the function of the nut would be nullified.

Phosphor Bronze Grade C, about 92% copper, 8% tin, and 0.1% phosphorus, 8 B&S numbers hard, has a tensile strength of about 112,000 psi. The Grade A alloy contains about 95% copper, 5% tin and 0.15% phosphorus and has a tensile strength of about 103,000 psi when rolled the same temper.



Speed Nuts made from Phosphor Bronze. Courtesy Tinnerman Products, Inc., Cleveland, Ohio.

Phosphor Bronze has many industrial applications because of its high corrosion resistance and excellent spring properties retained under repeated flexing. It is used widely for electrical snap switches, diaphragms, current collectors, spring contacts, and parts for electronic equipment.

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"Bridgeport" *District Offices and Warehouses in Principal Cities*

here's how

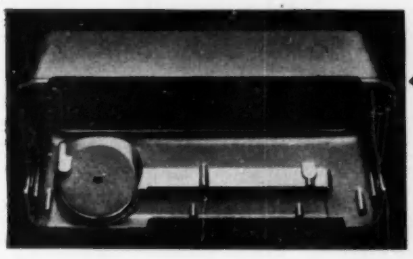
MAGNESIUM DIE CASTINGS

solve many problems.

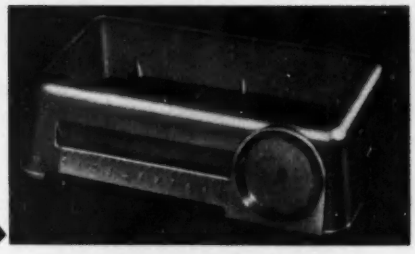
A Proved Material Competitively Priced

Magnesium has definite inherent advantages over other common die casting alloys, and—best of all—you don't have to pay a premium price to get them! In most cases *Dow magnesium die castings are competitive with other die castings* and in some cases they are cheaper.

Long past the experimental stage, magnesium has been tested and approved in a wide range of applications requiring an economically sound die casting material.



thin section over large projected area?



Dow can do it in Magnesium!

Wall thickness on the kitchen scale housing shown above ranges from .080" at the ends to .100" at the back, exemplifying the thin sections that can be die cast in magnesium. The over-all size of the housing is 12⅞" x 7⅛" x 3¼" yet the finished casting weighs just 12 oz.

You'll get many other advantages when you use magnesium die castings. Magnesium die casting alloys don't "creep" or "grow"—better tolerances are obtainable. Magnesium does not solder to the die—less draft required. Accurately located small diameter cored holes *with no taper* are possible in magnesium. When machining is required, you can do it faster with magnesium—it's the easiest of all die casting alloys to machine.

Use these inherent advantages to solve your die casting problems. Consult with Dow on design. They are experts in solving difficult die casting problems. Use Dow's high production die casting facilities to assure quality magnesium die castings at prices competitive with other alloys.

Write to Dept. MG-2

Magnesium Division

THE DOW CHEMICAL COMPANY

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Dow Chemical of Canada, Limited, Toronto, Canada

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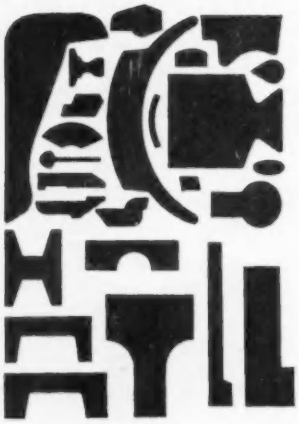
HOT ROLLED SHAPES

SAVE METAL • SAVE WORK
SAVE TIME • SAVE MONEY

Knife of steel alloy containing 18% Tungsten, 4% Chrome and 1% Vanadium. Made from shape shown in center illustration.

DISSTON HOT ROLLED SPECIAL SHAPES ARE SUPPLIED IN MANY FORMS



Disston hot rolled special shapes are supplied in both alloy and carbon tool steels, and in electric and open hearth grades. All shapes are rolled to close tolerances and the finish is exceptionally fine.

Send us dimensional sketches of the shapes you require, together with the analysis and approximate quantities desired. Full particulars will be sent to you promptly.

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131 Tacony, Philadelphia 35, Pa., U. S. A.

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Photo courtesy Pratt and Whitney Aircraft

Now many fabricators are making Silastic parts for the aircraft, automotive and electrical industries. And they have greatly improved materials to work with. There's Extreme Temperature Silastic, serviceable from —110° to +500°F . . . Low Compression-set Silastic to meet AMS 3304 and 3305, and Silastic 250, the strongest and toughest rubber available for service at temperatures from —100° to +500°F. It has greater tear resistance, 2 to 6 times the mechanical strength, 4 times the abrasion resistance of the best silicone rubbers previously available.

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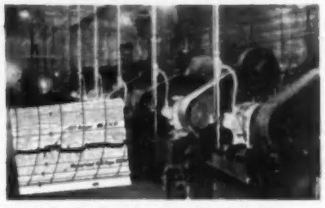

Photo courtesy The Dow Chemical Company

Dow engineers increased pumping capacity by having 12 of their 50 and 60 h.p. motors rewound with Dow Corning Silicone (Class H) Insulation. List price for new 75 h.p. Class A motors, $24,840. Rewinding cost $7,425. They saved $17,415 and got Class H motors able to withstand frequent peak loads of 86.5 h.p. as proved by recording ammeter chart above.

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You're half through before you start when you make cylindrical parts from Timken® seamless steel tubing instead of bar stock. Timken seamless tubing cuts time and cost because it eliminates drilling, reduces boring, saves scrap and permits faster machining speeds. Finish boring is often your first production step.

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3. *Superior forged quality improves the finished product*

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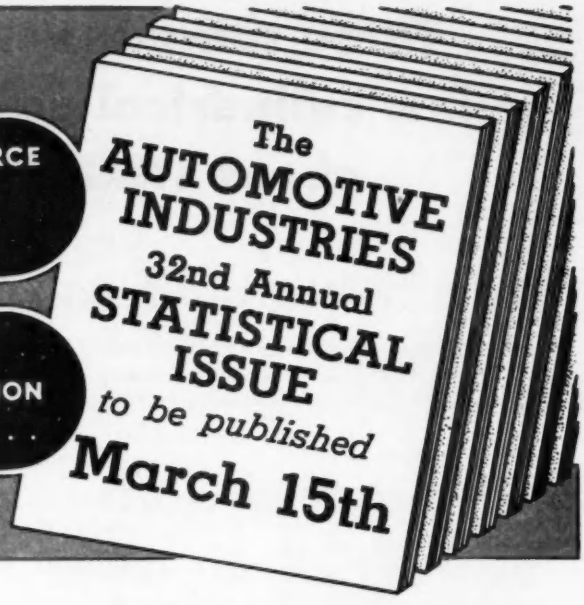

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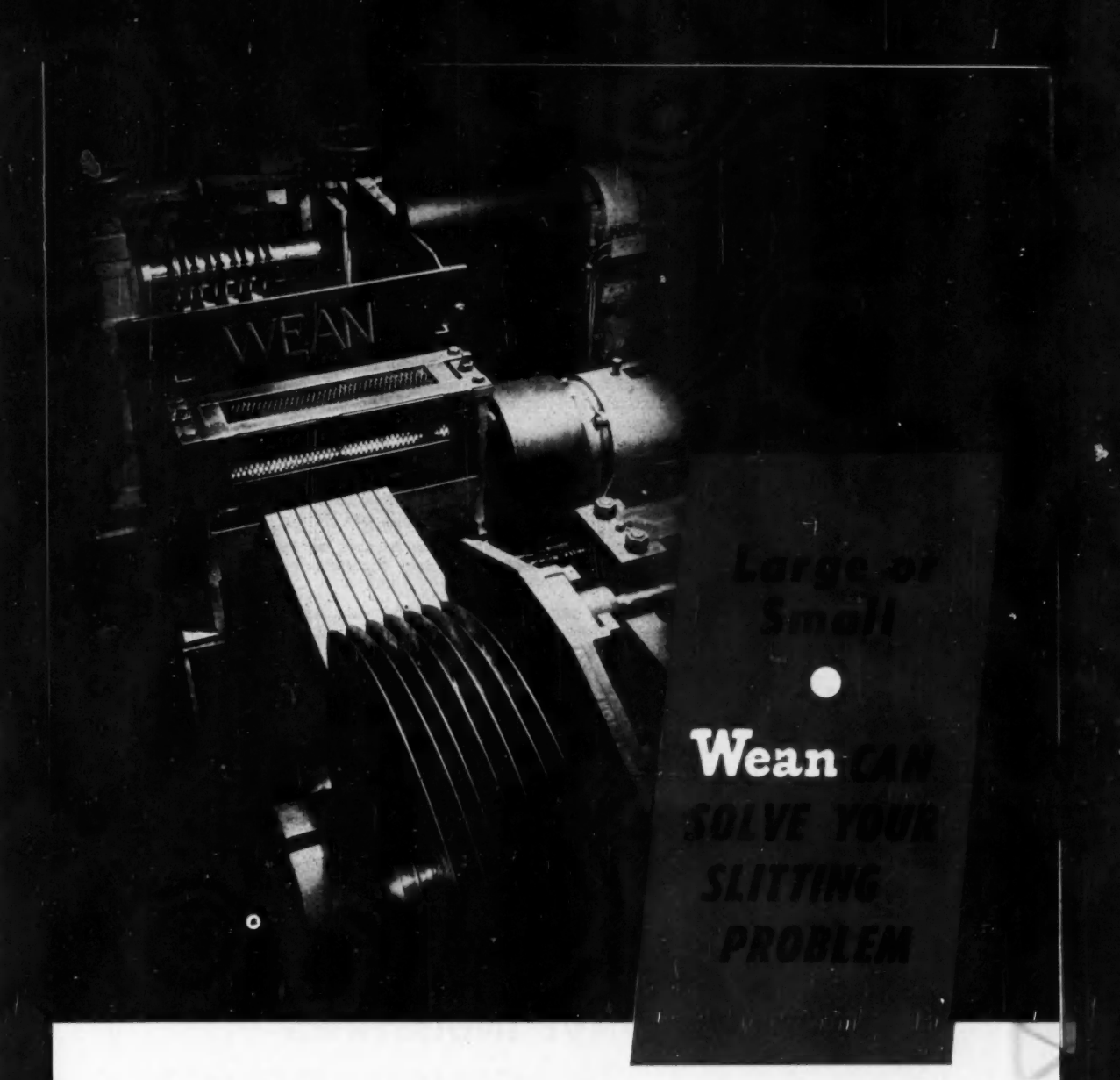

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Wean *Equipment Corporation*

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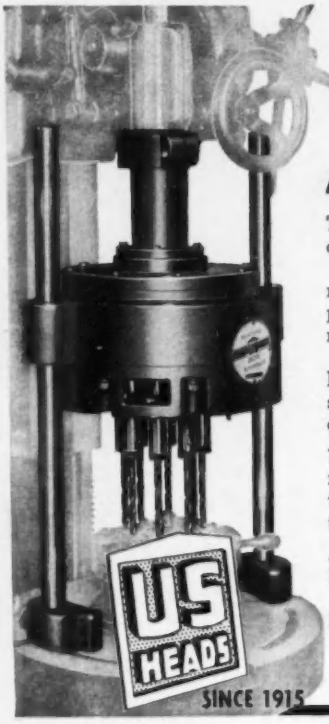

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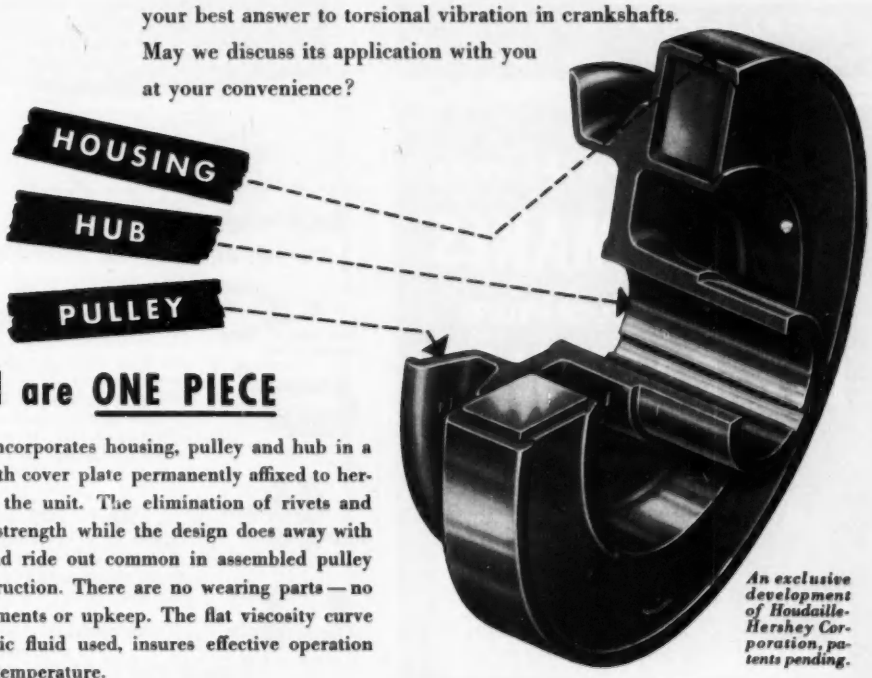

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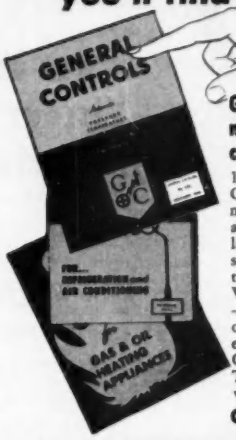

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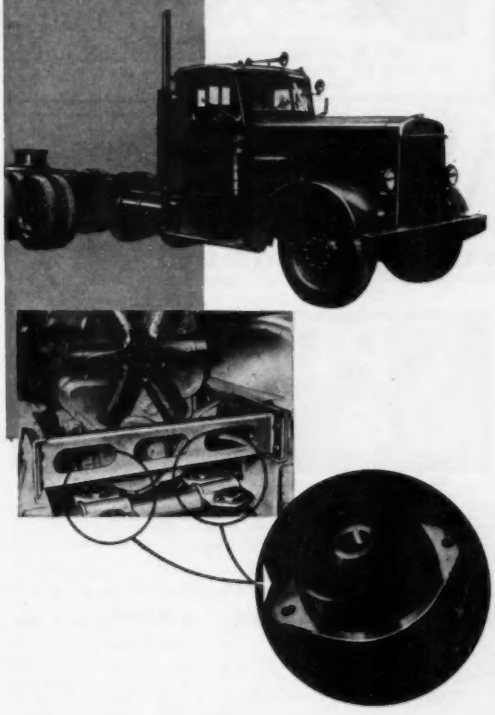
with a LORD vibration control system



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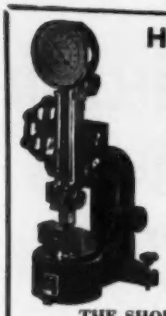

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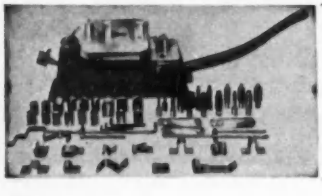

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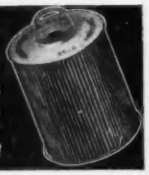

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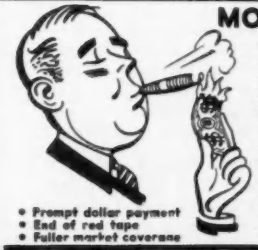

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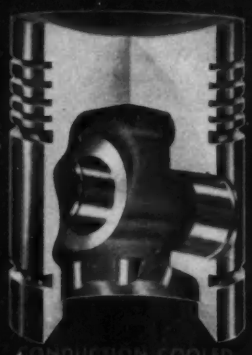

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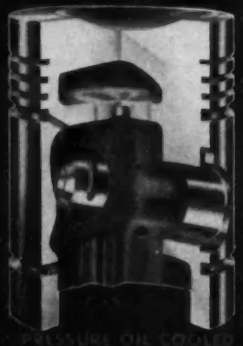

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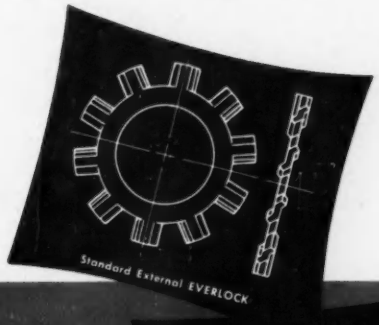

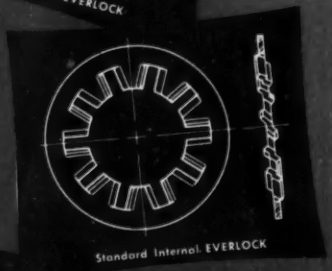

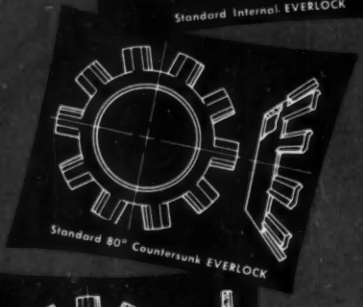

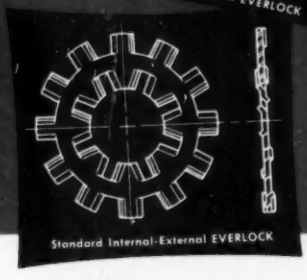

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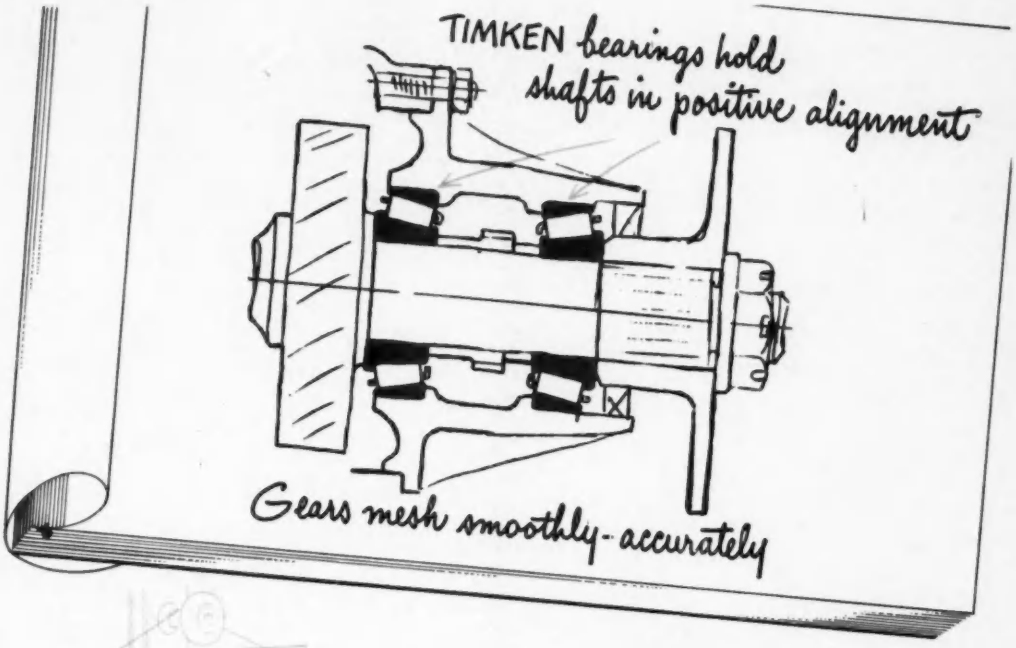

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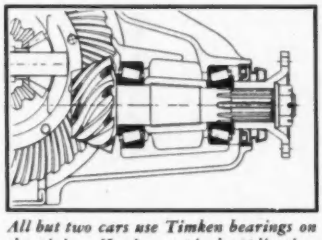

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